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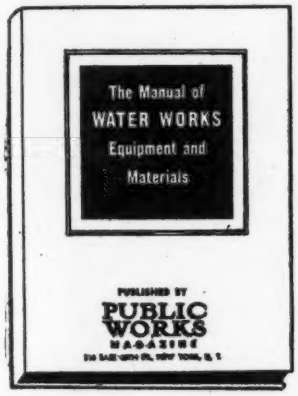

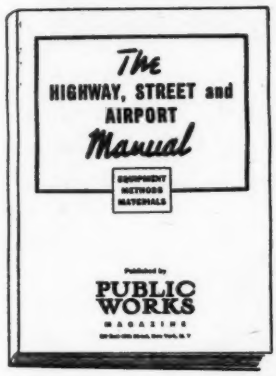

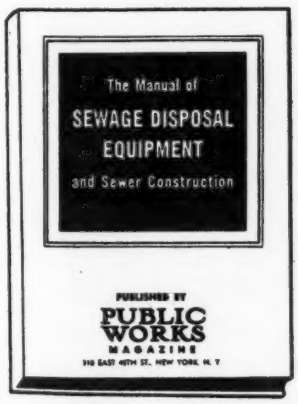

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A. PRESCOTT FOLWELL, Editor

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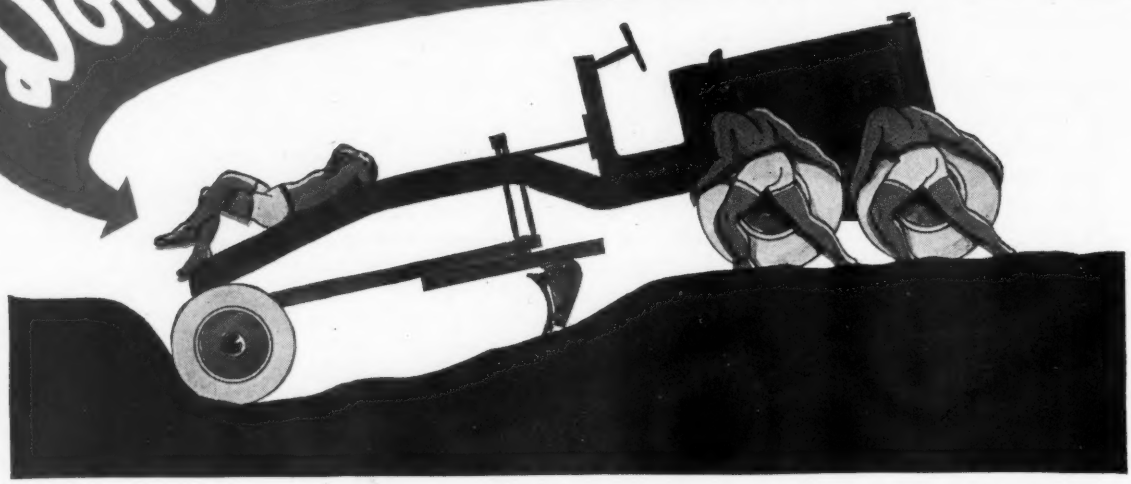

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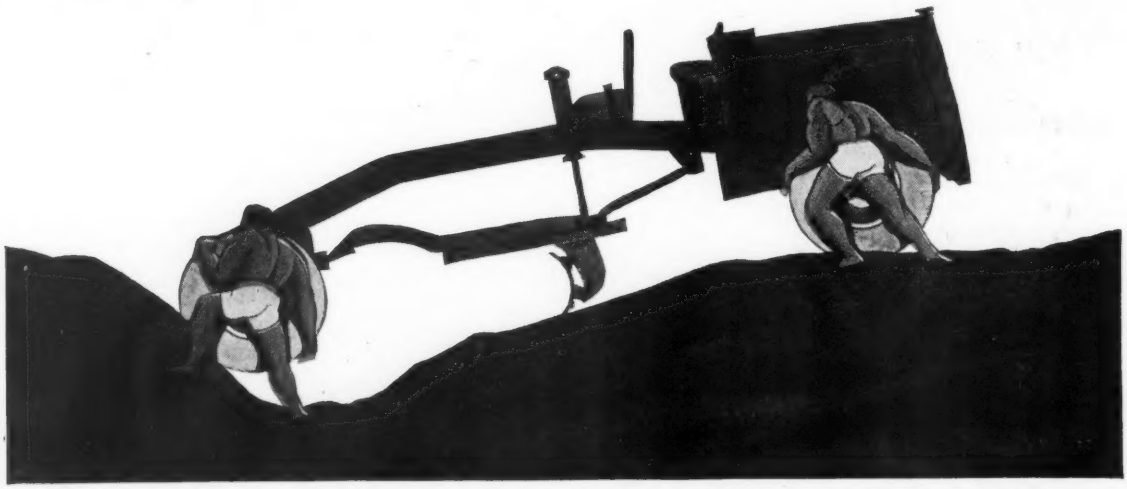

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THE WAR EMERGENCY

1944 Production of Highway Equipment

Prior to 1941 about 6,000 graders of all types were sold per year in the United States. Almost the same number were on order at the beginning of 1944, and at the end of the first quarter 1233 had been shipped and orders for 4855—almost a year's output—were still unfilled. Of the three types of graders, about two-thirds of these were motor graders, elevating graders and blade graders combined constituting the remaining third.

The condition as to snow plows was more favorable. During the first quarter, 1561 snow plows were shipped and there were unfilled orders for 611. The pre-war sales averaged 4,000 to 6,000 a year. Over three-quarters of these were of the blade and V-type, comparatively few of the rotary type being made.

Of street sweepers, about 500 or 600 a year were sold prior to 1941, when the number increased to 950, and to 1944 in 1943. During the first quarter of 1944, 488 were shipped, with 358 on order at the end of the quarter.

No Light Motor Trucks to be Available Yet

On July 14 the Office of Defense Transportation notified its 142 district offices not to accept new applications for light motor trucks, since WPB denied ODT'S request for resumption of light truck production beginning with the first quarter of 1945. There is therefore little likelihood for new light motor trucks being available during the first quarter of 1945. There has been no production of light trucks since the completion of the March 1942 schedule. Only 300 light trucks remain in the national pool available for essential civilian uses, against which there is a long list of applications.

Postwar Highway Program of U. S. Chamber of Commerce

As the result of a referendum of the membership of the U. S. Chamber of Commerce, that chamber has recommended a postwar highway program founded upon State and local control, with the function of the Federal government primarily one of coordination. Among the specific recommendations are: Specific highway programs should be based on comprehensive surveys giving adequate consideration to an over-all plan, to the economic benefits of each highway and to the whole public budget. Each state should be primarily responsible for highways of general use in its jurisdiction. Costs of construction and maintenance of highways of general use should be paid by the users of them; those of local roads and streets partly from general revenues and partly from user revenues. User revenues should be obtained by special taxes or fees based on logical standards reasonably commensurate with the value of the use, and no part of them should be diverted from highway purposes. Bonds should be issued only when an adequate program is impossible from current highway revenues. Allotments of federal aid among the states should give adequate consideration to traffic volume; should be matched by state funds in not less than equal amounts. Acquisition of right of way and offstreet parking facilities should be the responsibility of state or local jurisdiction.

Lumber Now the Most Critical Material

WPB has issued an amendment to L-335 establishing all-over control on lumber, irrespective of species, and on all users of lumber, wholesale and retail distributors, and all but the smallest sawmills. Class I consumers (requiring 50,000 ft. b.m. or more in one quarter) must file Form 3640 for authorization to purchase and certify all purchase orders. Persons needing less lumber, those needing it for mining and smelting operations, or for construction jobs expressly authorized by WPB or other federal agency need not file application, but must place both certified and rated purchase orders. The amount of lumber obtainable by those who have no ratings will depend on the amount permitted under a directive to be issued by WPB.

Bronze Water Meters Can be Manufactured

By an amendment to Schedule I of L-154, issued on June 15th, bronze is now permitted in the manufacture of water meters of one-inch size or less.

Also of interest to water users is Direction 3 to L-42, issued June 24th, permitting the production of 50,000 cast iron bath tubs during the third quarter of 1944.

Three Thousand Airports Recommended by CAA

William A. M. Burden, Assistant Secretary of Commerce, said on July 23 that the Civil Aeronautics Administration would recommend to Congress a billion dollar program for building 3,000 new airports, all except 100 to be small fields intended largely for private flying. (See "Airparks: The Wichita Plan," page 16 of this issue). Also proposed are improvements to 1625 of the existing 3086. It is presumed that Congress will require the States to match the federal appropriations for this work.

Cities and States Must Economize on Paper

Limitation Order L-340 limits the usage of all paper by all governmental units (other than the United States government) that consume more than a ton of paper a year or buy more than $1,000 worth of printing a year, to 75% of their 1942 tonnage. (All U. S. departments and agencies will be controlled by the Bureau of the Budget.) This is retroactive to July 1.

It applies to States, cities, towns or other governmental units. A ton of paper will make 5,000 to 15,000 copies of the average annual report of water department, public works department, etc. Unless the total publications of a municipality exceed this, they are not required to observe this conservation order, but it would be patriotic to do so. Printing done by or for governmental units is believed to consume approximately 600,000 tons of paper annually.

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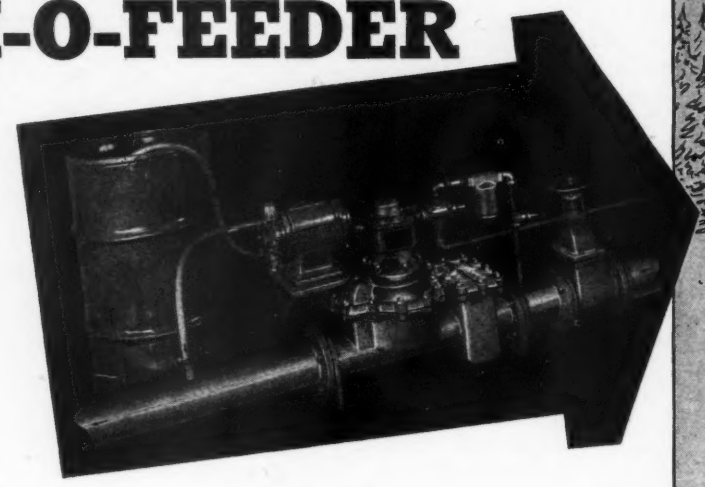

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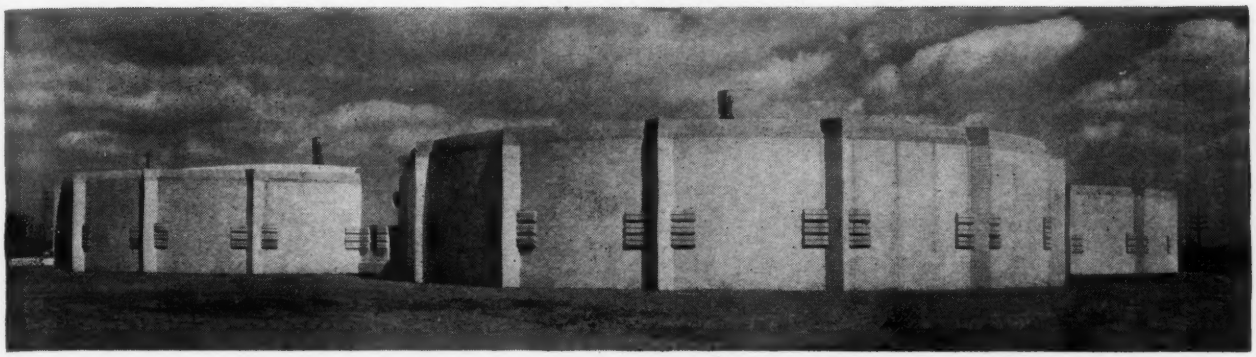


Hammond, Indiana, treatment plant, which went into operation late in 1941. Design population, 100,000. Illustration shows two primary tanks of the Dorr "Multdigestion" system, and the side of one of the two secondaries at the right. There is a sludge thickener, a detritor, mechanically equipped settling tanks, activated sludge aerators.

Present Trends in Sewage Treatment

Details of 280 plants constructed since 1940 provide a comprehensive idea of what the sanitary engineers of the country consider to be the best up-to-date designs for plants of all sizes, from the smallest to the largest.

IN the July issue we published data indicating the present trend in water treatment, based upon a census of the water treatment plants in the continental United States undertaken by the U. S. Public Health Service, which obtained the data from the State Departments of health. At the same time the U. S. P. H. S. obtained data concerning the construction of sewage treatment plants, and this article is based upon an analysis of these data.

This study includes only construction during the years 1941 and 1942, with a few plants still under construction in 1943. It therefore represents the latest practice in methods and equipment for sewage treatment. It "includes communities having organized sewer systems serving a resident population of 100 or more people. . . . Military facilities have not been listed."

All the states are represented but five; Massachusetts, Nebraska, Vermont and Wyoming reported no treatment plant construction or revision during 1942, and data for Arizona were "not at hand at time of assembly."

The population figures used in this article are the "design populations"—rated capacity of plant—rather than census populations, since the nature of the plant would presumably be based upon the former, and there have been more or less changes in population since the 1940 census.

The data have been grouped according to populations, since these would have a more or less determining effect upon the class of treatment used. Six groups were selected: those whose design populations lay between 100 and 1,000, between 1,000 and 5,000, between 5,000 and 10,000, between 10,000 and 25,000, between 25,000 and 50,000 and over 50,000. There were 95 communities of the smallest class, 122 of the 1,000 to 5,000 class, 24 of the 5,000 to 10,000 class, 21 of the 10,000 to 25,000 class, 9 of 25,000 to 50,000 class, and 9 of over 50,000; a total of 280.

The treatment units are classified under 17 major

Number of Each Type of Sewage Treatment Units Included in All Plants Constructed in 1941 and 1942

POPULATION GROUP	*No. of plants*	*S*	*G*	*O*	*C*	*K*	*F*	*I*	*A*	*E*	*D*	*B*	*L*	*T*	*Y*	*V*	*X*	*H*
100-1,000	95	47	3	—	95	—	51	8	6	28	15	62	—	—	—	—	—	—
1,000-5,000	122	82	14	2	121	5	69	10	19	48	63	101	—	—	—	1	—	1
5,000-10,000	24	16	5	2	23	2	14	2	4	10	18	19	1	—	—	1	1	—
10,000-25,000	21	16	5	—	21	2	13	1	5	14	20	18	—	1	—	4	—	2
25,000-50,000	9	7	6	2	9	2	8	1	1	4	7	6	2	—	—	1	—	—
Over 50,000	9	9	5	2	9	4	1	—	4	5	9	3	2	1	1	3	4	—
TOTALS	280	177	38	8	278	15	156	22	39	109	132	209	5	2	1	10	5	3

Treatment plant of Cranston, R. I.; design capacity 5.5 mgd. Contains detritor, comminutor, air diffusion for grease removal, mechanically cleaned settling tank, activated sludge, chlorination, sludge concentration tank, heated digestion tanks, elutriation tanks, vacuum filters and sludge incinerator.

heads, and these further classified under 55 minor heads. These heads and sub-heads are as follows:

Screens: fine; bar or other coarse type; bar or other coarse type, hand cleaned; bar, mechanically cleaned; comminutor.

Grit chambers: without continuous removal mechanism; with continuous removal mechanism; grit pockets at screen chamber.

Grease removal or *skimming tanks:* aerated; mechanically equipped.

Settling tanks: plain, hopper bottom; septic tank; two-story (presumably all Imhoff); mechanically equipped.

Chemical treatment type units or equipment (not necessarily complete for, or being operated with, application of chemicals); flocculation tank, air agitation; flocculation tank, mechanical agitation; chemicals used; no chemicals used.

Contact beds.

Intermittent sand filters.

Trickling filters: with fixed nozzles; with rotary distributors; high rate; magnetite filters.

Sewage application to land: with cropping; subsurface application; land underdrained.

Aeration: plain, without sludge return; activated sludge with mechanical aeration; activated sludge with diffused air aeration; contact aerators.

Chlorination: by hypochlorite; chlorine gas; with contact tank.

Separate sludge digesters: with stirring or concentrating mechanism; unheated; with floating cover; with fixed cover; open; gas used for heating; gas used in engines, heat as by-product; gas storage in digester or separate holder; two-stage; gasometer cover; gasometer in fixed cover.

Sludge beds: open; glass covered.

Sludge lagoon.

Sludge thickener: (sub-heads as for digesters).

Elutriation tank: (sub-heads as for digesters).

Mechanical sludge dewatering.

Sludge incinerator: circular, multiple hearth type; flash drying type.

Sludge storage tanks: (sub-heads as for digesters).

In the accompanying tables the columns are headed by the symbols used by the U. S. P. H. S. in its classification, the kind of treatment denoted by each symbol being as follows:

Meaning of symbols

A = Aeration
B = Sludge beds
C = Settling tanks
D = Separate sludge digesters
E = Chlorination
F = Filters
G = Grit chambers
H = Sludge storage tanks
I = Sewage application to land
K = Chemical treatment
L = Sludge lagoon
O = Grease removal
S = Screens
T = Sludge thickener
V = Mechanical sludge dewatering
X = Sludge incinerator
Y = Elutriation tank

One interesting feature of these data is the high proportion of small communities. About 78% of all construction was for communities of 5,000 or less; 34% for those of 1,000 or less. Of course few of these small plants included the more specialized equipment. No plant for less than 5,000 population included sludge thickeners, elutriation tanks or sludge incinerators; and none of 1,000 or less included sludge storage tanks or mechanical sludge dewatering.

Courtesy Portland Cement Ass'n.

Plant for 500 population at La Crescent, Minn. Includes bar screen, mechanically equipped settling tanks, trickling filter, heated digester with fixed cover, hypochlorinator with contact tank, and open sludge bed.

Another feature that stands out is that settling tanks are universally used. Only 2 of the 280 plants have no tanks—Bremerton, Washington, population 7,560, which has only a comminutor, the sewage being discharged into Washington Narrows; and Richmond Beach, Washington, population 2,250, which uses a comminutor and chlorinates and discharges into Puget Sound where the water is 30 ft. deep at mean low tide.

After settling tanks, the next most common feature is sludge beds, included in 209 plants. Then, in the order of their number, come screens, filters, sludge digesters, chlorination, aeration, grit chambers, land application, chemical treatment, mechanical sludge dewatering, grease removal, sludge lagoons, sludge incinerators, sludge storage tanks, sludge thickeners, and one elutriation tank.

Variations of the Several Types

Settling Tanks. Of perhaps equal interest is the relative use of the several variations of each type. It is noteworthy that although these are almost all small plants, only 19 of them include septic tanks, but 126 include 2-story tanks. Also, of all settling tanks other than septic and 2-story, fully 60% are equipped with mechanical sludge removers—possibly many more, as 29% did not specify on this point.

Sludge beds. Of the 209 plants installing sludge beds, 15 reported them as being covered, these being located in Maine, Connecticut, New York, New Jersey and Pennsylvania—all having cold winters. Of the remainder, 126 reported open sludge beds, and 68 did not specify which but probably if they were covered the fact would have been mentioned.

Screens. Of the 177 plants using screens, 9 used both ordinary screens and comminutors, giving a total of 186. None of these were fine screens. There were 48 plants which installed comminutors. Mechanically cleaned screens were installed in 11 plants; hand-cleaned in 79. The remaining 48 did not specify; probably most of them were hand cleaned.

Filters. Of the 156 filter installations, 21 were intermittent sand filters, 2 were magnetite filters, and the remainder were trickling filters. Of these, 70 reported revolving distributors, 19 nozzle distributors, and 18 did not specify which. 32 were high-rate filters. Six plants had two kinds of filters, mostly trickling filters supplemented by sand filters. No contact beds were installed.

Sludge digesters. Separate sludge digestion was included in only 15 of the smallest plants; in 63 of the

Number of Each Type of Sewage Treatment Units Included in Plants Constructed in 1941 and 1942 by Communities With Design Populations of 100 to 1,000

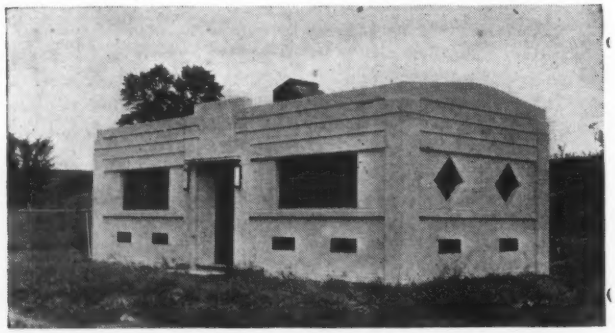
State	*No. of plants*	*S*	*G*	*C*	*F*	*I*	*A*	*E*	*D*	*B*
Alabama	3	—	—	3	—	—	—	—	—	3
California	2	1	—	2	1	2	—	—	1	1
Colorado	1	—	—	1	—	—	—	—	—	—
Connecticut	1	—	—	1	—	—	—	1	—	1
Delaware	1	1	—	1	1	—	—	—	1	1
Florida	2	—	—	2	—	1	—	1	—	—
Georgia	2	1	—	2	1	—	—	—	1	2
Illinois	7	7	—	7	5	—	—	—	1	7
Indiana	1	—	—	1	—	1	—	—	—	—
Iowa	7	—	—	7	7	—	—	1	—	3
Kansas	2	2	—	2	2	—	—	—	—	2
Kentucky	2	2	—	2	1	—	—	1	1	2
Louisiana	1	1	—	1	—	—	1	1	1	1
Maine	5	1	—	5	3	1	—	—	—	—
Maryland	2	2	—	2	—	—	—	2	—	2
Minnesota	7	6	—	7	5	—	—	5	—	5
Mississippi	4	—	—	4	3	—	1	—	—	—
Missouri	6	4	1	6	5	—	—	1	1	5
Montana	2	—	—	2	—	1	—	1	—	—
Nevada	2	—	—	2	—	—	—	—	—	—
New York	1	1	—	1	—	—	—	1	—	1
N. Carolina	6	2	1	6	1	—	—	—	—	3
N. Dakota	1	1	1	1	1	—	—	—	—	1
Ohio	5	5	—	5	3	—	—	—	—	5
Oklahoma	1	—	—	1	1	—	—	—	—	—
Oregon	1	1	—	1	1	—	—	—	1	1
Pennsylvania	2	2	—	2	2	—	—	2	—	2
Texas	3	—	—	3	—	1	2	—	1	2
Virginia	8	4	—	8	6	—	—	7	3	7
Washington	1	1	—	1	—	—	1	1	1	1
West Virginia	4	1	—	4	1	—	1	2	1	3
Wisconsin	2	1	—	2	1	1	—	1	1	1
TOTALS	95	47	3	95	51	8	6	28	15	62

Number of Each Type of Sewage Treatment Units Included in Plants Constructed in 1941 and 1942 by Communities With Design Populations of 1,000 to 5,000

STATE	*No. of plants*	*S*	*G*	*O*	*C*	*K*	*F*	*I*	*A*	*E*	*D*	*B*	*V*	*H*
Alabama	5	2	1	—	5	—	2	—	—	3	5	5	—	—
Arkansas	1	1	1	—	1	1	1	—	—	1	1	1	—	—
California	6	2	—	—	6	—	5	2	—	3	5	3	—	1
Colorado	1	1	1	—	1	—	1	—	—	—	—	—	—	—
Florida	1	1	1	—	1	—	—	—	—	1	—	1	—	—
Georgia	3	3	—	—	3	—	1	—	—	—	1	3	—	—
Idaho	1	—	—	—	1	—	—	1	—	—	—	—	—	—
Illinois	12	11	—	—	12	—	8	—	4	1	5	12	—	—
Indiana	3	1	—	—	3	—	1	1	—	—	—	2	—	—
Iowa	9	1	—	—	9	1	9	—	—	—	4	6	—	—
Kansas	1	1	—	—	1	—	1	—	—	—	—	1	—	—
Kentucky	2	2	—	—	2	1	1	—	—	2	1	2	—	—
Louisiana	1	1	—	—	1	—	—	—	1	1	1	1	—	—
Maine	1	1	1	—	1	—	—	—	—	1	—	1	—	—
Maryland	1	—	—	—	1	—	1	—	—	1	1	1	—	—
Michigan	1	—	—	—	1	—	—	—	—	1	1	—	—	—
Minnesota	6	6	1	—	6	—	5	—	1	6	3	5	1	—
Missouri	5	5	—	—	5	—	4	—	—	1	3	5	—	—
Montana	1	—	—	—	1	—	—	1	—	—	—	—	—	—
Nevada	2	2	—	—	2	1	—	1	1	—	2	2	—	—
New Mampshire	1	1	—	—	1	—	—	—	—	1	—	—	—	—
New Jersey	1	1	—	—	1	—	1	—	—	1	1	1	—	—
New Mexico	1	—	—	—	1	—	1	1	—	—	—	1	—	—
New York	9	8	6	—	9	1	4	—	—	8	4	7	—	—
N. Carolina	6	3	1	—	6	—	3	—	1	2	1	6	—	—
N. Dakota	1	1	—	—	1	—	—	—	—	—	—	1	—	—
Ohio	11	11	—	—	11	—	8	—	1	1	5	10	—	—
Oregon	1	1	—	—	1	—	1	—	—	—	1	1	—	—
Pennsylvania	5	5	—	—	5	—	4	—	1	4	3	5	—	—
S. Carolina	1	—	—	—	1	—	—	—	—	—	—	—	—	—
Tennessee	1	1	—	1	1	—	1	—	1	—	1	1	—	—
Texas	11	1	1	—	11	—	2	3	7	3	8	10	—	—
Utah	2	2	—	—	2	—	1	—	—	1	2	1	—	—
Virginia	2	1	—	—	2	—	—	—	1	1	1	2	—	—
Washington	4	4	—	—	3	—	2	—	—	4	2	3	—	—
W. Virginia	1	—	—	—	1	—	—	—	—	—	—	—	—	—
Wisconsin	1	1	—	1	1	—	1	—	—	—	1	1	—	—
TOTALS	122	82	14	2	121	5	69	10	19	48	63	101	1	1

Number of Each Type of Sewage Treatment Units Included in Plants Constructed in 1941 and 1942 by Communities With Design Populations of 5,000 to 10,000

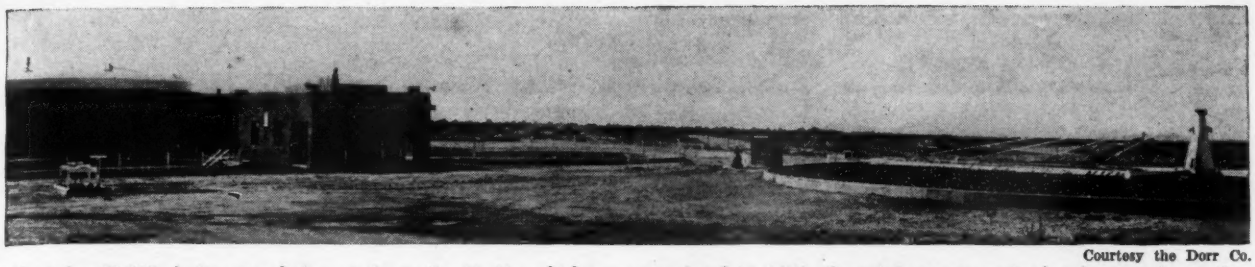
STATE	*No. of places*	*S*	*G*	*O*	*C*	*K*	*F*	*I*	*A*	*E*	*D*	*B*	*L*	*V*	*X*
Alabama	1	—	—	—	1	—	1	—	—	1	1	1	—	—	—
Colorado	3	3	1	—	3	—	2	2	—	—	2	2	—	—	—
Idaho	1	—	—	—	1	—	—	—	—	1	1	1	—	—	—
Illinois	1	1	—	—	1	—	—	—	1	—	1	1	—	—	—
Iowa	1	—	—	—	1	1	1	—	—	—	1	1	—	—	—
Kentucky	2	2	1	—	2	—	1	—	1	—	2	2	—	—	—
Louisiana	1	—	—	—	1	—	1	—	—	1	—	1	—	—	—
Maryland	1	1	—	1	1	—	1	—	—	1	1	—	—	1	1
New Jersey	1	1	—	—	1	1	1	—	—	1	1	1	—	—	—
New York	1	1	1	—	1	—	—	—	—	1	1	1	—	—	—
North Carolina	1	1	—	—	1	—	1	—	—	—	—	1	—	—	—
Ohio	2	2	—	1	2	—	2	—	—	1	1	—	1	—	—
Pennsylvania	1	1	—	—	1	—	1	—	—	1	1	1	—	—	—
Tennessee	2	1	—	—	2	—	1	—	—	—	2	2	—	—	—
Texas	3	—	1	—	3	—	1	—	2	1	2	3	—	—	—
Washington	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Wisconsin	1	1	1	—	1	—	—	—	—	1	1	1	—	—	—
TOTALS	24	16	5	2	23	2	14	2	4	10	18	19	1	1	1



Plant for 2,000 population at Wayzata, Minn. Includes comminutor, trickling filter with rotary distributor, liquid chlorine with contact tank, heated sludge digester, and open sludge bed.

1,000 to 5,000 size; in 18 (75%) of the 5,000 to 10,000 class; in 20 of the 21 of the next class; in 7 of the 9 of the 25,000 to 50,000 class; and in all of those over 50,000. Stirring or concentrating mechanism was included in 14 of the 132 tanks; 9 only were unheated; in 46 sludge gas was used for heating, and in 6 it was used for operating engines with heating as a by-product; while 11 provided gas storage. Floating covers were used in 22 plants, fixed covers in 34, and 7 were open. Gasometer covers were incorporated in 2 plants. 13 plants were two-stage.

Chlorination with hypochlorite was provided in 6 plants, with chlorine gas in 68, and 28 plants failed to specify which was used. Contact tanks were provided



Courtesy the Dorr Co.

Plant for 20,000 design population at Santa Fe, N. M., which was completed in 1942. Contains screens, grit chamber, mechanically cleaned settling tanks, biofilter, 2-stage digesters, gas used in engines; sludge to sludge beds, effluent applied to land.

in 25 plants. Of the 6 plants using hypochlorite, 5 were for under 5,000 population, and the sixth for under 10,000.

For some reason, the use of chlorination seems to prevail in some states, to be absent in others. No use of chlorination was reported by Colorado, Delaware, Georgia, Kansas, Maine, Mississippi, Montana, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Carolina; while all these plants provided for chlorination in Louisiana, Maryland, Michigan, Minnesota, New Hampshire, New Jersey, Rhode Island.

Aeration. Activated sludge treatment was provided in 24 plants, 14 using mechanical aeration and 9 diffused air, with 1 not specified. Two plants aerate without sludge return. Contact aerators were included in 12 Texas plants and one other.

Grit chambers. Of the 36 grit chamber installations, 14 were provided with continuous removal mechanism, 10 were without such mechanism and for 12 this was unspecified. In two plants there were grit pockets at the screen chamber.

Land application. Sewage effluents were applied to land by 22 communities, 1 each in Maine and Florida and the other 20 in Texas and the far west. Cropping was practiced in 5 cases. Three were subsurface applications and in 2 cases the land was underdrained.

Flocculation tanks were incorporated in 11 plants, 9 with mechanical agitation and 2 with air agitation.

Chemical treatment was provided for in two plants but no chemicals yet used in one of them.

Mechanical sludge dewatering (presumably vacuum filters) was provided in 10 plants; 6 of less than 25,000 population.

Sludge incinerators were installed in 5 plants; 2 were of the multiple-hearth type, one the flash drying, and 2 not specified.

Average Practice

It might be interesting to consider what types of equipment were installed by half of the communities of each class, as representing the average practice for that class. This gives:

For the 100-1000 class: screens, settling tanks, filters and sludge beds.

For the 1,000 to 5,000 class: screens, settling tanks, filters, separate sludge digesters and sludge beds.

For the 5,000-10,000 class: screens, settling tanks, filters, separate sludge digesters and sludge beds.

(Continued on page 24)

Number of Each Type of Sewage Treatment Units Included in Plants Constructed in 1941 and 1942 by Communities With Design Populations of 10,000 to 25,000

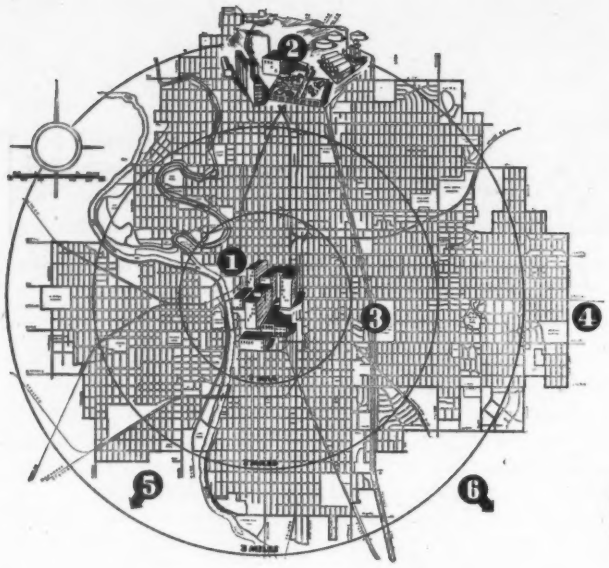
STATE	*No. of plants*	*S*	*G*	*C*	*K*	*F*	*I*	*A*	*E*	*D*	*B*	*T*	*V*	*H*
California	3	3	—	3	—	3	—	—	3	3	2	—	—	—
Florida	1	—	—	1	—	—	—	—	1	1	1	—	—	—
Indiana	1	—	—	1	1	—	—	1	1	1	1	—	—	—
Kansas	1	1	—	1	—	1	—	—	—	1	1	—	—	—
Missouri	1	1	—	1	—	—	—	1	—	1	1	—	—	—
New Mexico	2	1	1	2	—	2	1	—	—	1	2	—	—	—
New York	4	4	3	4	1	1	—	—	4	4	2	1	4	—
Pennsylvania	1	1	—	1	—	—	—	1	1	1	1	—	—	—
Tennessee	1	1	—	1	—	1	—	—	1	1	1	—	—	1
Texas	4	2	1	4	—	3	—	2	1	4	4	—	—	—
Washington	2	2	—	2	—	2	—	—	2	2	2	—	—	1
TOTALS	21	16	5	21	2	13	1	5	14	20	18	1	4	2

Communities With Design Populations of 25,000 to 50,000

STATE	*No. of plants*	*S*	*G*	*O*	*C*	*K*	*F*	*I*	*A*	*E*	*D*	*B*	*L*	*V*
Iowa	1	1	1	1	1	—	1	—	—	1	1	—	—	1
North Carolina	1	1	1	1	1	1	1	—	—	1	1	1	—	—
Ohio	1	1	1	—	1	—	1	—	—	1	—	1	—	—
South Carolina	1	1	1	—	1	—	1	—	—	—	1	1	—	—
South Dakota	2	2	2	—	2	1	2	—	1	1	2	1	2	—
Texas	3	1	—	—	3	—	2	1	—	—	2	2	—	—
TOTALS	9	7	6	2	9	2	8	1	1	4	7	6	2	1

Communities With Design Populations of Over 50,000

STATE	*No. of plants*	*S*	*G*	*O*	*C*	*K*	*F*	*A*	*E*	*D*	*B*	*L*	*T*	*Y*	*V*	*X*
California	4	4	—	1	4	1	1	1	2	4	1	1	—	—	1	1
Indiana	1	1	1	—	1	1	—	1	1	1	—	—	—	—	—	1
Michigan	1	1	1	—	1	1	—	—	1	1	1	1	—	—	1	1
Rhode Island	1	1	1	1	1	—	—	1	1	1	—	—	1	1	1	1
Texas	2	2	2	—	2	1	—	1	—	2	1	—	—	—	—	—
TOTALS	9	9	5	2	9	4	1	4	5	9	3	2	1	1	3	4



Wichita Airpark Plan. Numbers indicate approximate locations proposed for airports.

Airparks The

By ANDY S. SWENSON
Chairman of The Aviation Committee of the Chamber of Commerce of Wichita

FOUR in-town "Airparks"—three of them within the city limits and one within the downtown shopping district—are projected for Wichita, Kansas, as part of a comprehensive airport program submitted to city officials for their consideration by the Wichita Chamber of Commerce.

The Wichita Plan was developed by the Chamber's Aviation Committee in cooperation with local airplane manufacturers and air facilities experts, to provide a complete and balanced program for aviation development for Wichita in the postwar era.

The standout feature of the plan is a proposed system of compact landing fields—"Airparks"—built in the city for the use of private airplanes. These would serve business, industrial, and residential areas. To illustrate, somewhere in downtown Wichita there would be an airpark located within easy walking distance of the main shopping district and principal business offices. Another such airpark would probably be located somewhere in the north Wichita industrial district adjacent to Wichita's huge stock yards, the grain elevators, oil refineries, packing houses, and other plants.

The plan includes the present Wichita Municipal Airport, for many years considered among the nation's finest commercial fields. With the refinements and additions made necessary as a result of war activity, it is believed that existing facilities at this airport will be ample to handle all anticipated commercial cargo and passenger planes for some time to come. The airport is located southeast of the city, a twenty-minute drive from the business district.

Auxiliary to the municipal airport would be an additional municipal field located some distance southwest of the city. It would relieve the existing municipal field of miscellaneous activities which hinder commercial traffic. Practice flights and student instruction would be centered here. It would also serve as a field for fixed base operators and airplane dealers, with repair and maintenance facilities for non-commercial airplanes.

General outlines of this "Wichita Plan," together with illustrative sites, selected only because they illustrate the possibilities for small landing areas within and near the city, have been submitted by the Aviation Committee to city officials, under whose guidance the plan would be developed if approved by the public. It is well understood that further consideration and study might develop better and more practical locations, although it is believed that the airparks should be located in the approximate areas indicated.

In formulating this layout of airports and airparks, not only were the needs of a greatly expanded commercial air transportation era anticipated, but also the requirements of non-scheduled air traffic and the private flyer.

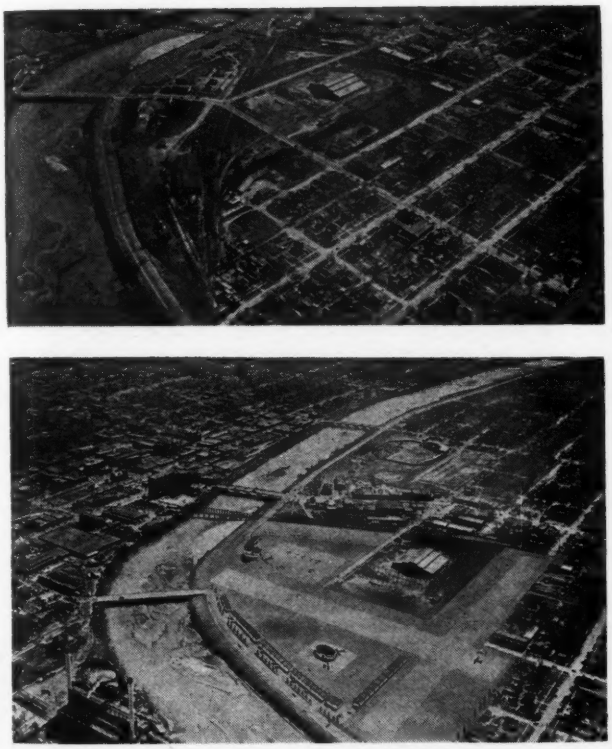
Airparks such as these proposed in the plan for the downtown business district and the industrial areas would be an important factor in the postwar commercial and industrial development of Wichita by providing an incentive and convenience for the private plane owners to visit Wichita for business purposes. In addition, the proposed plan would provide for the more casual visitor to Wichita and also for the Wichita private plane-owner, through the establishment of airparks in or near one or more residential areas, either within the city or just outside the city limits.

The Wichita Plan places emphasis on the development of facilities for the private airplane, because it is to the private airplane that we must look for the

Airpark in the north industrial district (Site 2 on the map) adjacent to stockyards, grain elevators, oil refineries and other plants.

The Wichita Plan

Proposed by the Aviation Committee of the Chamber of Commerce. Its oustanding feature is a system of compact landing fields located inside the city for the use of private airplanes.



Upper view, an airpark site (No. 1 on the map) as it appears today, within walking distance of the downtown shopping and business district. Lower view, the same, showing suggested airpark.

development of aviation to a major peacetime industry. Private airplanes before the war constituted more than 85 per cent of total aircraft, and may be expected to maintain or even increase that percentage in the postwar period.

Federal aviation authorities are in accord with the thinking underlying the Wichita Plan. William A. M. Burden, special aviation assistant to the Secretary of Commerce, says, "The development of private flying provides aviation's only opportunity to become a mass production industry. The volume of private airplane sales depends to a large extent on the utility of the airplane, and the utility of aircraft . . . will depend on an extensive system of conveniently located private airports. Therefore, it is not too much to say that the provision of adequate facilities for private flying is the primary postwar airport problem."

Illustrative airpark in the residential district, using waste space by covering an unsightly drainage canal. Site 3 on the map.

It is the Committee's belief that only through the development of the private airplane into a medium of mass transportation could we hope to rebuild and hold any sizable proportion of our existing wartime airplane-building capacity. Enough flying equipment to fill even the most optimistic estimate of requirements for postwar cargo and passenger development could be built by existing plants within two or three months. Forecasting the future of aviation on the basis of commercial aircraft alone, the Committee points out, would fall as far wide of the mark as would the predicted growth of the automobile industry, had it been based on sales of trucks and busses.

The postwar personal airplane is going to have a lot to offer the average citizen for his transportation dollar. Because of important technological developments, manufacturers will be able to build small planes with sufficient speed to cover five or six hundred miles in a half day, yet with the utmost economy

of operation, quietness and comforts, such as radio, self-starters and others, far beyond anything known today. With slower landing speeds, spin-proof features, and lower first costs, the postwar personal airplane can be expected to have a tremendous potential as a medium of mass transportation. But even though the manufacturers include all these features, to achieve the greatest utility value the personal airplane must have some place to go. That is, landing facilities must exist at the places the air traveler wants to visit.

The necessity for such landing facilities is stressed by C. I. Stanton, administrator of the Civil Aeronautics Authority, who says: "We realize that if the private aircraft is to be of the maximum service to the owner, landing facilities will have to be established in locations convenient to the centers of interest to the individual aircraft owner." Mr. Stanton also estimates that the number of private owners will reach 500,000 by 1950, which would mean one airplane for approximately each 300 persons in this country.

The airparks outlined for Wichita appear to indicate the type of facility needed throughout the country in both large and small cities to give the airplane the maximum utility as transportation. With them, the air traveler is actually brought within the city.

The suggested "downtown" location would be just a few minutes' walk from hotels, theatres, department stores and major office buildings.

Farmers, stockmen and grain dealers, who now visit Wichita by the hundreds daily, would be brought equally as close to their business destination by an airpark in the northside industrial district.

Wichita resident plane owners would derive the most benefits from airparks near the East High and east side residential sections, although considerable transient traffic might also be expected to use these fields. Here the hangars for permanent storage of planes would be a principal feature, while in the industrial and downtown districts, transient airplane accommodations would be foremost.

By providing landing facilities within the city, Wichita would greatly enlarge its trade territory, bringing increased business to Wichita firms. Cross country travelers, encouraged to stop by the close-in landing facilities would also mean revenue to the city's merchants.

Cost of a system of "Airparks" such as proposed would be negligible in comparison to most municipal aviation projects. Such installations take full advantage of the economy afforded by the landing characteristics of the postwar airplane. These smaller planes require landing strips of from 1500 to 2500 feet in length, about 200 feet wide. The strips can be one- or two-directional, with the two strips joining to form a "V" or "L". An "Airpark" at East High could consist merely of one north and south strip about 2500 feet long, formed by surfacing over the unsightly drainage canal. Based on prevailing winds at that location, the single strip would be usable approximately 90 per cent of the time. When wind conditions would not pemit a landing there, one of the other three "airparks" could be used.

It is believed that—at the outset at least—concrete runways would be unnecessary in the Wichita airparks. Good turf, well drained, or artificially stabilized soil where good turf does not exist, will furnish a very satisfactory and permanent landing surface which will stand heavy traffic. Landscaped, with modern hangars and facilities, such parks add to the attractiveness of the city.

Aviation minded Wichitans, including those connected with Wichita's airplane plants—who have definite plans for building planes after the war—envision the Wichita Plan as a pacemaker in the nation's aviation development. They see Wichita's aggressive step toward "bringing the airplane to town" as a leadoff move which it is hoped will encourage such lowcost and convenient landing facilities in hundreds of other cities, large and small, throughout America.

Preventing Spring Breakup of Roads

Spring breakup is getting increased attention from highway engineers, because they recognize it as a symptom of underlying conditions which cause road failures. This is such an important problem that at the last meeting of the Highway Research Board a new committee was organized for field study of freezeproofing treatment of subgrade soils with calcium chloride for prevention of frost action.

While frost boils and heaving are only symptoms of what's wrong underneath the surface, they are important because they point out the exact locations in the road which need attention. Some engineers place markers along roads in the spring to serve as reminders for later corrective treatment of faulty subgrade conditions. Records of maximum heave are also being made where suitable bench marks permit.

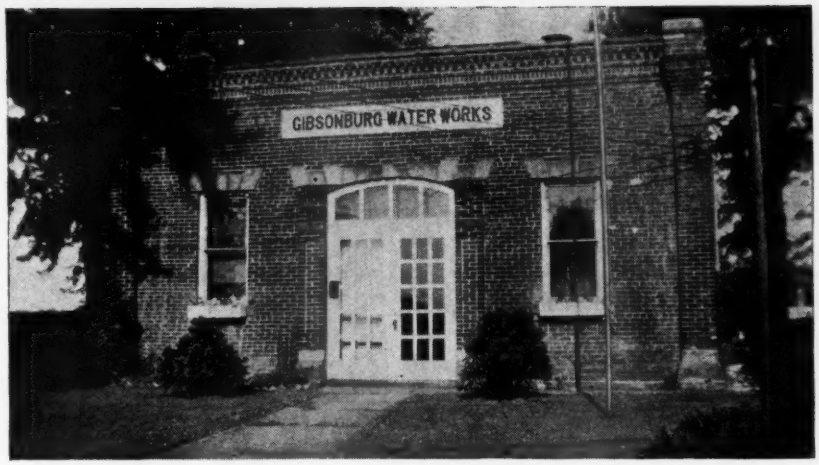
The prevention of detrimental frost action, or more generally called "spring breakup," is of vital importance, not only for uninterrupted road service but for an easier maintenance with more lasting character. Stopping the eruption of frost boils by treating the subsoil in the area with calcium chloride, has been accomplished by a number of highway engineers. Research shows that as little as ½ to 2% of calcium chloride by weight of subsoil will prevent detrimental frost action.

The procedure has been generally to dig holes one foot in diameter and 30 inches in depth, spaced 6 feet apart and staggered in four rows parallel to the center line, or 68 holes per 100 feet of road. At the bottom of the hole a disc of waterproof paper is placed to encourage lateral dispersion of the calcium chloride. The hole is then filled to within 4 inches of the top with a mixture of two parts pea gravel or crushed uniform stone and one part calcium chloride. In heavy soils, possibly a better method is to dig shallower holes or trenches, backfilling with a fine sand and gravel mix and saturated with a solution of calcium chloride (4 pounds to a gallon of water). In the top 4 inches, stabilized gravel, moisture-bound with calcium chloride, is tamped.

One engineer reports a frost boil treatment, costing $35, was 100 per cent effective through its first severe winter, and the cost of treatment was less than the emergency maintenance cost for one spring breakup. Even where occasional retreatment may be necessary, this procedure is generally far more economical than to replace or bridge over the faulty subsoil.

Areas treated in this manner have held firm for years thereafter, although, if necessary, the same spots may be retreated by drilling a small hole into the sand pockets and repriming with a strong calcium chloride solution.

This is the type of maintenance which pays for itself in the long run, because it means that in subsequent years less expensive operations are necessary. Therefore, this is the kind of maintenance which projects its benefits into the future and may be included in what now is being called "Projective Maintenance."—From *Calcium Chloride Association News.*



Gibsonburg's Pumping Station

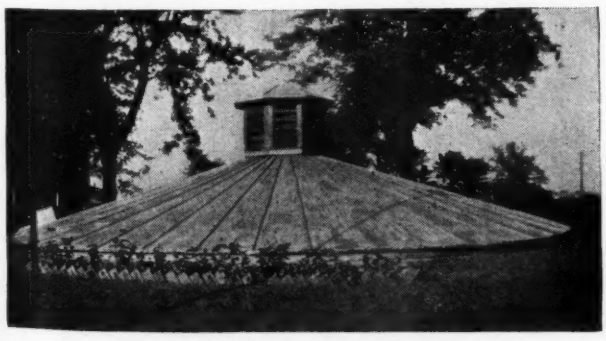
Curing Red Water Troubles at Gibsonburg, Ohio

Pumping from a new well directly into the distribution system was followed by complaints of red water. The trouble was cured by pumping first into a receiving reservoir.

By **ALBERT WAGNER**
Superintendent, Board of Public Affairs

GIBSONBURG, Ohio, a town of about 2300 population, owns its water supply, which was originally installed in 1897. The supply at that time was from two drilled wells, one located within the pumping station and the other in the yard. Both wells are about three hundred feet deep. Well number one had an 8″ casing and was pumped by a deep-well turbine and discharged direct to the distribution system. Well number two, which has a 10″ casing and 4″ drop pipe, is pumped by air and discharges into a brick and concrete receiving reservoir 30 feet in diameter and 14½ feet deep, having a capacity of 77,000 gallons, which is located immediately outside the pumping station. The exact capacity of the wells is unknown but the supply has always been ample for normal consumption demands. During a fire several years ago, it was shown that there was 420 gpm available for a twelve-hour period. Also the supply of water was little affected by the extremely dry weather in 1934.

Well number one was abandoned in the year of 1940, when it was found that surface water had broken in and the tubing was full of holes, and the Board of Public Affairs decided to drill a new well about four hundred feet from the pumping station. The new well, which was drilled to a depth of 313 feet, yielded little water until after it had been shot with 300 pounds of dynamite. A Pomona deep-well turbine pump was installed, which pumped the water direct into the distribution system.



Roof of the receiving reservoir.

After pumping this new well for several months, we started to get complaints about red water. Before this well was in operation it had been necessary to flush the distribution system about once in a year, but after that it was necessary to flush the system about every month, and even then we could not overcome our trouble. Many people blamed the red water on the new well, but after a number of tests I discovered that the water was from the same underground source as well number two, which had given good water for over forty years.

By this time all the basins and other plumbing fixtures in town were discolored and I decided to do something about it. I applied a spigot to a can and hung it over the lavatory in the plant, arranging so that water from the can dropped continuously onto the surface of the lavatory. The can was filled, in succession, with water from both wells and out of the reservoir. The only water that did not discolor the lavatory was the water from the reservoir. At a meeting of our Board of Public Affairs, I made a suggestion to pump the water from the new well into the reservoir for settling and aeration, which the Board gave me permission to do.

To get this water into the reservoir we had to lay a 6″ main from the new well to the reservoir. We in-

(Continued on page 24)

Layout of Tucson's treatment plant. The old plant is shown by dotted lines, the recent additions by full lines.

View of existing digesters showing concrete domes and gas holders added. Digester No. 1, on the right center, has a flat concrete top.

New Additions to the Tucson Sewage Works

The 16-year-old plant, providing primary treatment and broad irrigation, had to be enlarged to double the capacity, including pumping to higher land for irrigation. Elimination of hydrogen sulphide from the sewers.

By R. M. CUSHING, Assoc. M. Am. Soc. C. E.
Headman, Ferguson, Carollo & Classen

THE City of Tucson, the second largest city in Arizona and located in the southeastern section of the State, recently placed in operation newly constructed additions to its sewage treatment plant and collecting system. This construction was made necessary by the influx of Army personnel and workers in war industries.

The plant that existed before the present additions were constructed provided primary treatment for the sewage, followed by broad irrigation of farm crops. Its construction was based on a report made by Black & Veatch in 1926. It consisted of a bar screen; two clarifiers of 30 feet inside diameter having a 10-foot side water depth; and four digestion tanks 35 feet in diameter by 25 feet side water depth, one of which had a fixed concrete cover, while the other three were open. This plant cost approximately $72,800 at the time of its construction in 1928.

The records of plant operation in 1940 indicated the average sewage flow to be 2.41 million gallons per day, but between 1940 and 1941 the flow increased to 3.26 million gallons per day. In 1940 the population of Tucson, according to the 1940 U. S. census, was 36,818, of which 32,000 was estimated to be served by sewers. In 1941, 4,000 Army personnel were moved into the area around Tuscon and, in addition, people indirectly connected with the Army activities had taken up residence in Tucson, so that in 1941 it was estimated that the collecting system was serving 44,000 people. By 1942, it was estimated that there were 10,000 Army personnel in the area around Tucson and that 8,000 more would be in the area by the end of 1943; which would mean a future sewered population of 58,000 in Tucson and its environs.

When the Army first moved into Tucson, they proposed to construct a sewage treatment plant for treating their own sewage. This plant would have been in the highly restricted residential district southeast of Tucson and the city officials very promptly opposed such a move and suggested that they would be able to handle this sewage at the city treating plant. As was the case with many Army camps, this camp was no sooner built than additions were under construction; also, additional fields and manufacturing plants were constructed to the south of the city, so that it was soon apparent that the Tucson sewage treatment plant would not be able to handle this increased amount of sewage unless it were enlarged.

In 1941 a report had been made of the flows and conditions of the treating plant and at that time the following additions were recommended:

1. Construct an additional screen chamber with an automatic screen cleaning mechanism.
2. Make provision for chemical treatment and construct a chemical and laboratory building.
3. Construct an additional sedimentation unit in combination with flocculation, with the necessary sludge pumps, pump house, and piping.
4. Add another sludge digestion tank having a gas holder cover. In conjunction with this addition, cover the three digestion tanks that are now open.
5. Increase sludge bed capacity.
6. Add an effluent line carrying irrigation water back across the Santa Cruz river to irrigate additional land.

As an interesting sidelight, in the examination of records of sewage flow and population growth it was revealed that the city had increased 13% in population from the period of 1930 to 1940, of 1.3% per year; also that the sewage flow had increased 18% from the period of 1926 to 1940, or an increase of 1.3% per year. However, during the year 1940 to 1941, the sewage flow increased 35% in the one year.

After attempts to secure financing from other sources had produced no results, Phil Martin, City Manager, applied to the U. S. Army for $160,000

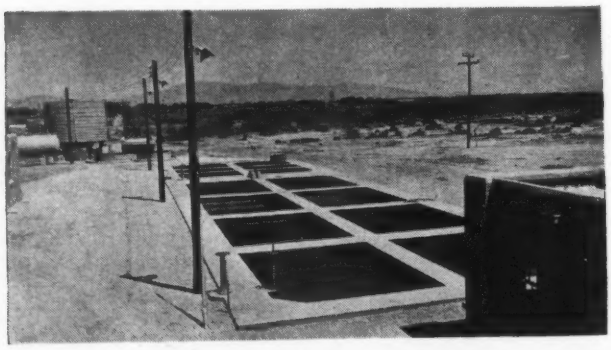
to be used in the construction of additions to the sewage treatment plant and for the addition of plants for applying chemicals to the collecting system. This request was granted and the funds were received; and plans for the work were completed and bids were opened on January 4, 1943. The three lowest bids were $131,865.36 by M. M. Sundt Construction Company, $157.968.88 by Fisher Contracting Company, and $168,469.75 by a third bidder. The high bid was $173,625.00. The contract was awarded to lowest bidder, whose bid was approximately $27,000 under the engineer's estimate. Because of this low bid, the city was able to increase the planned additions to the treating plant to further increase its efficiency and aid in the disposal of the final effluent. Among the major additions made were:

1. An irrigation pump house for housing a low-head pump to lift the sewage effluent to higher ground and allow the cultivation of an additional 40 acres of ground. This pump is to be operated by gas from the digestion tanks.
2. Purchase of 1800 feet of 12-inch irrigation pipe.
3. Additional acid storage tanks.
4. Additional shelving, cabinets, tables, and benches in laboratory.

Periodic examinations had been made by the city engineer's force to determine the amount of hydrogen sulphide and total sulphides in the collecting system, since it had been necessary to replace one 15-inch line of concrete pipe approximately 2¼ miles long in 1940 and another line approximately 1200 feet long in 1942, due to disintegration by hydrogen sulphide. Two portions of the systems were found to be most seriously in need of protection—a line from the U. S. Veteran's Hospital and one from the Davis-Monthan Airbase. Accordingly, a plant was installed to supply copperas or ferrous sulphate to each of these sewer lines; which treatment would also aid in controlling odors in the collecting system.

Each of these chemical plants consists of a brick building containing a storage space for ¾ of a carload of dry sugar-size copperas and housing a Wallace and Tiernan type MOF dry feeder having a vitreous solution pot and an extended chemical hopper. Four time clocks and three time switches were inserted in the electric control circuit of this feeder; the time switches allowing any proportion up to 100% of the setting of the feeder to operate, and the time clock repeating this feeding setting in the twenty-four-hour cycle.

At this time there are four changes in feed rate during the twenty-four hour period, these changes occurring five times during the day in line with the fluctuation of the flow of sewage in the sewer. At the present time the feeding rate is approximately 50% more than that required theoretically to neutralize the hydrogen sulphide in the sewage. There has been no opportunity to make tests on these two plants since they were placed in operation so that their efficiency is not known. Since these chemical plants were placed in residential districts, the buildings were designed to conform to the construction of the neighborhood. An existing ferrous chloride plant that dosed a third section of the collecting system with ferrous chloride has not been remodeled; however, plans have been made to improve the plant and install program control.



View of sedimentation unit, taken from new digester. Reaction tanks, chemical building, coagulant tank and acid storage tank at the left.

The design population for the sewage treatment plant was set at 58,000, with a design average daily flow of 4 mgd. None of the major units of the existing plant was abandoned, additions to the plant being made to bring the capacity up to the design basis. The existing screen was removed and replaced by a new screen 4 feet wide, with 1½-inch clear openings between the bars, automatically cleaned by a Link Belt "Tritor" screen and grit cleaning mechanism. A by-pass channel with a manually cleaned screen was provided around the mechanical cleaning mechanism, so that, in case of repair, the sewage could be by-passed around the automatic screen or, in case of stoppage or plugging of the main screen, the sewage would automatically overflow around this screen and through the by-pass.

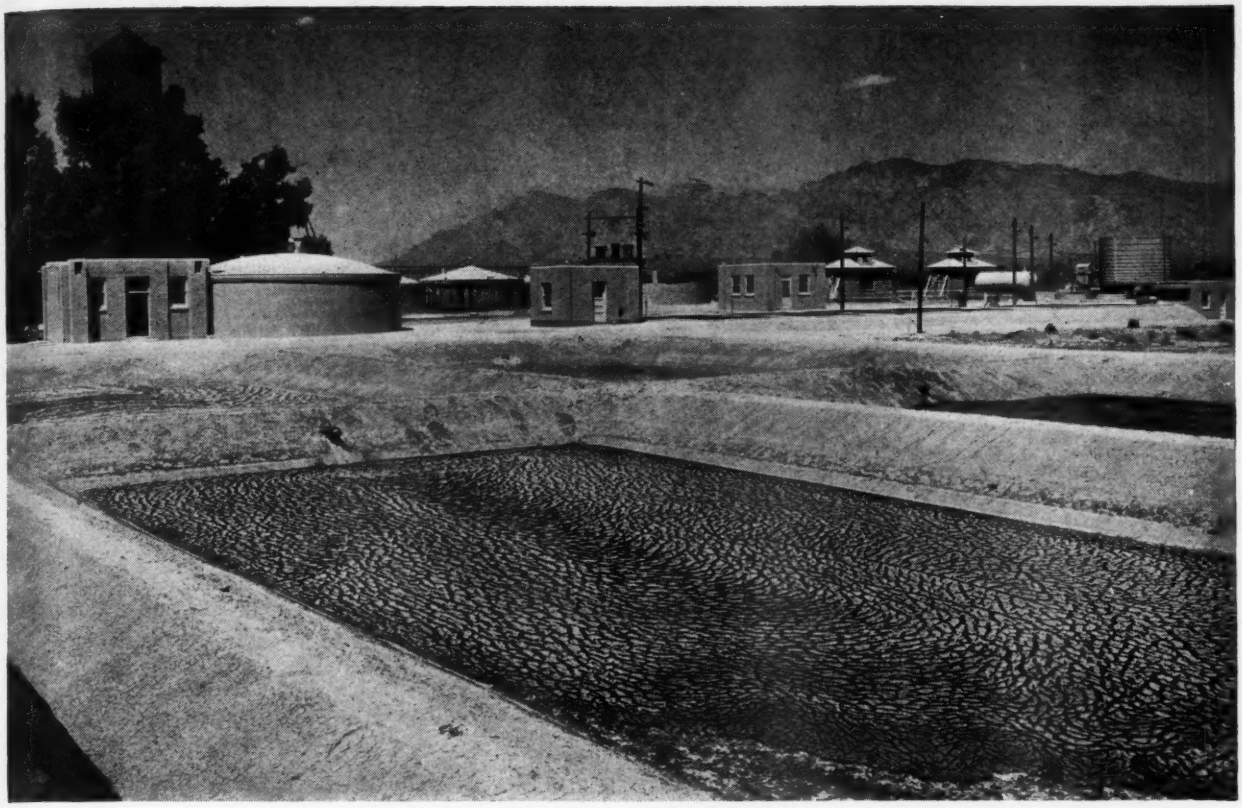
In this same structure there was constructed a Parshall Venturi flume having a 2-foot throat equipped with a float-controlled recording and indicating mechanism manufactured by Leupold, Volpel & Company. Following the flume are the control gates for proportioning the flow of sewage between the old plant and the new structures. The new structures were designed to handle approximately two-thirds of the design flow of 4 mgd, the remaining one-third being handled by the old.

The new primary sedimentation tank is of the "flow-through" type, having mechanical coagulators or mixers that precede the sedimentation compartment. These mixers consist of three sets of paddles 7 ft. in diameter, driven by a common drive unit, supplied by the Link-Belt Company and including a speed reducer which allows the operator to vary the speed of the mixers from 2 revolutions per minute to 4.8 revolutions per minute, or from a peripheral speed of .7 foot per second to 1.7 feet per second. This mechanism was placed in the mixing compartment of the sedimentation unit, which is 31 ft. wide by 32 ft. 6 in. long, and has an 8 ft. water depth.

The sedimentation compartment, a continuation of the mixing or coagulation chamber, is 31 ft. wide by 96 ft. 6 in. long, with 10 feet water depth. It is equipped with Link-Belt "Straight-Line" sludge collectors and a cross collector. The coagulating chamber provides for thirty minutes' retention at the designated flow of two-thirds of 4 mgd and the sedimentation compartment provides for two hours retention. The new units are preceded by coagulation.

A wet well was constructed and a pump house to house a gas engine-driven irrigation pump for elevating the treated sewage effluent to higher ground than it would be possible to irrigate by gravity flow. The gas engine will be an old truck engine reclaimed from the city shops and converted to use sewage gas for fuel.

The portion of the treated sewage effluent not pumped flows to the outfall structure to combine there with the effluent from the existing plant and be used for irrigation on the city's 400-acre farm.



View of plant taken from sludge bed border: Buildings, from left to right, are: Digester control house, digester, existing digester No. 3 with gas holder cover, irrigation pump house, existing digester No. 1, sludge pump and laboratory building, digester mechanism housings, acid storage tanks, elevated coagulant tank, chemical building.

One new sludge digestion tank was added to the four existing tanks. The new tank is 38 feet in diameter with a side water depth of 20.75 feet, and has a fixed concrete dome cover. One of the four existing digestion tanks originally had a concrete cover and under this construction project the other three tanks were covered, two with concrete domes and one with a gas holder type cover. The gas lines from all five tanks were connected to the gas holder.

The existing digestion tanks originally were interconnected by large ports at the bottom of their common walls. The port between digesters 2 and 3 was closed with concrete so that, of the old digesters, numbers 1 and 2 will work as a unit, as will digesters 3 and 4. The existing digesters are 35 feet in diameter by 25 feet side water depth. The total volume of digestion space after the construction was completed amounted to 120,300 cubic feet.

The gas from the digestion tanks is piped for use in heating the pump house and chemical room, and provision has been made for future installation of an incinerator for burning the screenings. Gas is also available for use in the gas engine for driving the irrigation pump, as previously stated. All gas used for heating and pumping is metered separately from the gas burned in the waste burners. Varec gas protective devices were supplied for the digestion tank and gas systems and Pittsburgh Equitable sewage gas meters for metering the gas.

A new pump house and laboratory building was constructed which houses two new Chicago "screw-peller" sludge pumps and an up-to-date laboratory containing approximately $700 worth of equipment for checking the results of the sewage treatment processes. Piping was added to the existing piping system so that, in conjunction with the sludge pumps, the following operations are possible:

1. Drawing sludge from digesters 2, 4 or 5 to any sludge bed.
2. Recirculate sludge from digesters 2, 4 or 5 to 1, 3, or 5.
3. Recirculate supernatant from digesters 2, 4, or 5 to digesters 1, 3, or 5.
4. Return supernatant from digesters 2, 4, or 5 to the distribution box.
5. Draw supernatant from digesters 2, 4, or 5 to any sludge bed.
6. Draw sludge from new sedimentation unit to digesters 1, 3, or 5.
7. Draw sludge from the old sedimentation unit to digesters 1 or 3.
8. Drain most of the new sedimentation unit by gravity.
9. Drain the remainder of the new sedimentation unit by pumping to diversion box or digesters 1, 3, or 5.
10. Overflow from digesters 2 or 4 to old sludge beds.
11. Overflow from digester 5 to new sludge beds.

All the motors for operating the plant can be controlled from a switch panel located in the laboratory building or may be individually controlled from each motor. A separate pressure system is provided with a positive air break for supplying packing gland seal water to the sludge pumps. A Yeomans Bros.' sump pump discharges the drain water to the sedimentation unit. Trumbull Electric Mfg. Company supplied the switch panel for controlling the equipment.

A plant was constructed for making chlorinated ferrous sulphate to be used as a coagulant in settling the sewage. This process uses scrap iron obtained from the city's garbage incinerator and reduces it to ferrous sulphate by the addition of sulphuric acid. This solution in turn is mixed with a solution of chlorine and

water to produce the coagulant. The coagulant is made at a constant rate and pumped to the storage tank, from which it is fed to the sewage. A coagulant feeder was developed which proportions the rate of feed of the coagulant to the flow of sewage, using the float well of the Parshall flume for control. The coagulant is placed in the sewage just ahead of the sedimentation units.

For treating the four million gallons of sewage with approximately two grains per gallon of coagulant, 400 pounds of iron, 600 pounds (about 40 gallons) of sulphuric acid, and 240 pounds of chlorine are required per day. A sulphuric acid storage tank holding one car of sulphuric acid is provided at the plant. Provision is made for storing one month's supply of iron and the reaction tanks have enough space for one week's supply of iron. Wallace and Tiernan chlorinators control the chlorine and International Filter Company solution feeders are used for controlling the flow of sulphuric acid to the reaction tanks and the flow of ferrous sulphate to the vitreous contact chamber at which point the chlorine solution is added. Water to the reaction tanks and to the chlorinator is accurately metered so that the solution strength can be calculated at any time. The conduit for the coagulant and chemicals is made of hard rubber and the coagulant feeder is a rubber-lined steel tank. Provision has been made for the use of ton cylinders of chlorine.

Engineering designs and engineering supervision for construction have been handled by Headman, Ferguson & Carollo of Phoenix, Arizona. James G. Hess was resident engineer on the project, with the assistance and cooperation of Phil Martin, Jr., acting city manager, and the late R. E. Stallings, city engineer, and other city officials.

Present Trends in Sewage Treatment

(Continued from page 15)

For the 10,000-25,000 class: screens, settling tanks, filters, chlorination, separate sludge digesters and sludge beds.

For the 25,000-50,000 class: screens, grit chambers, settling tanks, filters, separate sludge digesters and sludge beds.

For those of over 50,000: screens, grit chambers, settling tanks, chlorination, and separate sludge digesters. Dewatering and incineration are used for sludge disposal in 4 of the 9 large plants, and sludge lagoons in 2 others.

Curing Red Water Troubles at Gibsonburg

(Continued from page 19)

stalled an automatic float switch to keep the reservoir full at all times. It was necessary to pump the water from this reservoir to the system at a little extra cost. When we had this equipment ready for operation we flushed the distribution system and continued to pump that way for about a month. Then we flushed the system again and were pleasantly surprised to learn that we had almost eliminated all of the red water. After repeating this for about two more months the red water disappeared entirely. So at a very low cost of about $150 we overcame a very bad situation.

I'm not in a position to know just what reaction this aeration and settling had on the water, but it eliminated all of our trouble here. I know that our water here is a little on the sulfur side and maybe that caused it to attack our mains and fixtures. Just for a test a few days ago, I pumped the water again direct into the distribution system and in three days telephone calls started coming in from our consumers, wanting to know what was wrong with the water. So of course we turned back to the aeration.

Corrosion of Hot Water Systems

In their annual report for 1943, the Little Rock, Ark., Board of Water Works Commissioners say:

"Corrosion control of cold water in the distribution system was satisfactory. In view of the fact that non-corrosive materials for hot water heater tanks were not available, Micromet feeder installations for individual tanks were encouraged, and experiments were conducted to attempt to develop a method of preventing the corrosion of hot-water systems."

The water purification plant comprises a coagulation and settling basin, two clear-water basins, and 18 filters with a total area of 5264 sq. ft. The chemicals used were alum, lime, chlorine, calgon, carbon, soda ash and anhydrous ammonia. In purifying 3,984,400,000 gal. there were used 223,500 lb. of alum, 274,140 lb. of lime, 104,314 lb. of chlorine and 7,650 lb. of anhydrous ammonia, 36,122 lb. of calgon, 350 lb. of carbon (in October only) and 6,500 lb. of soda ash, at a total cost for chemicals of $15,542. The amount of water treated was 200,000 gal. greater than in 1942.

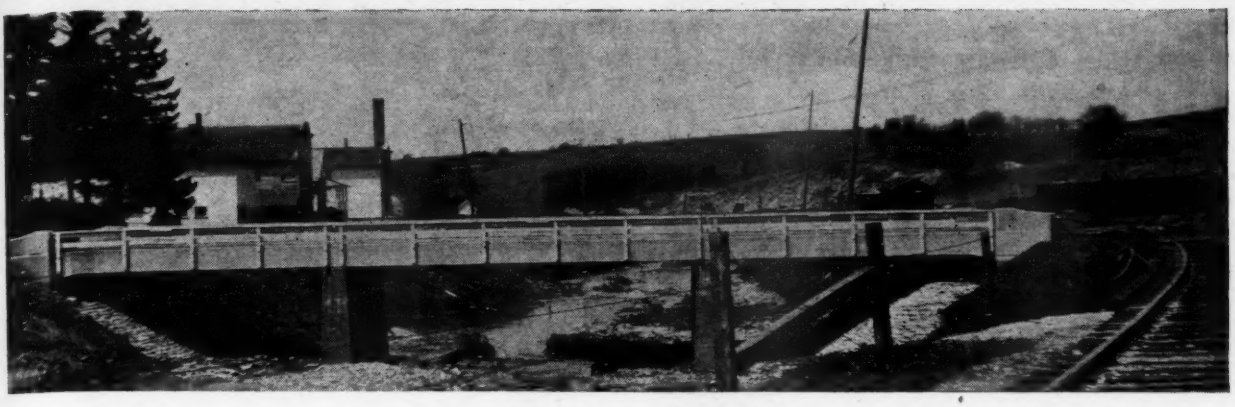
Disposal for Pail Latrines

One of the Army camps in Florida was located on low land where the water level was only 24" below the surface of the ground and consequently pit latrines were unsatisfactory and the pail latrine system was used instead, there being 1970 pails in use.

For disposal of the contents of these, four areas were located where the ground water was at least 6 ft. below the surface. Holes 6 x 6 x 6 ft. were dug and the pails emptied into these, each hole being used three or four days. At the end of each day the hole is thoroughly sprayed with No. 2 Diesel oil and 6" of loose dirt is thrown in to cover it for the night. The spraying includes the sides of the hole and an area 2 ft. wide around the top. When a hole has been filled to within 18" of the top, the surface is well sprayed and the balance of the hole filled with loose dirt. As the contents of the hole dries and the surface of the fill falls, additional dirt is added each day until the ground becomes firm, when two mounds are built over each hole and marked with wooden markers on which is given the date the hole was filled. "The "graves" are sprayed with No. 2 Diesel oil every week for several months. After more than six months of use there had been no fly or other breeding at any of them.

A $24,000,000 Aqueduct for Venezuela

Venezuela's National Institute of Public Works has signed a contract with a United States firm for a new aqueduct in Caracas, work on which is to begin immediately. Costing approximately $24,000,000, the project will be one of the largest of its kind in Latin America and will include four reservoirs with a 15,700,000 cubic meter capacity. When finished, the new aqueduct will supply each of the city's 378,000 inhabitants with an average of 85 gallons of water a day.



General view of the completed bridge.

Concrete Bridge Designed for Minimum Critical Material

A three-span continuous reinforced concrete slab 90 feet long and 18 feet wide, on pedestal-type piers, which cost only $6,107.

By FRANK W. ARNESON
County Highway Engineer, Winneshiek, Co., Iowa

WINNESHIEK COUNTY, IOWA, on May 30th, 1941, suffered a very severe flood, which destroyed and damaged a number of bridges on the secondary road system. WPB rulings made reconstruction impossible without first securing their approval to "begin construction," and projects for replacing several of these bridges were submitted to them, but denied because they were considered "not a direct aid to the war effort."

However, over a year later, in the latter part of June, 1942, a second application was submitted, and approval was secured for one permanent bridge job. The type of construction of this bridge was unusual and a description of it may be of interest to highway engineers.

The bridge, which is located at the edge of a small town, was designed by the State Highway Commission as a three-span continuous reinforced concrete slab 90 ft. long by 18 ft. wide; the span lengths being 27'-6":35'-0":27'-6". The contract cost of the bridge, with its two piers and two abutments, was $6,107, which is considered very reasonable.

In designing the bridge the effort was made to secure a single-lane H-15 loading, with provision for adding in the future a wearing surface weighing 19 lb. per sq. ft., with the use of a minimum of concrete and critical materials.

View showing construction of pier.

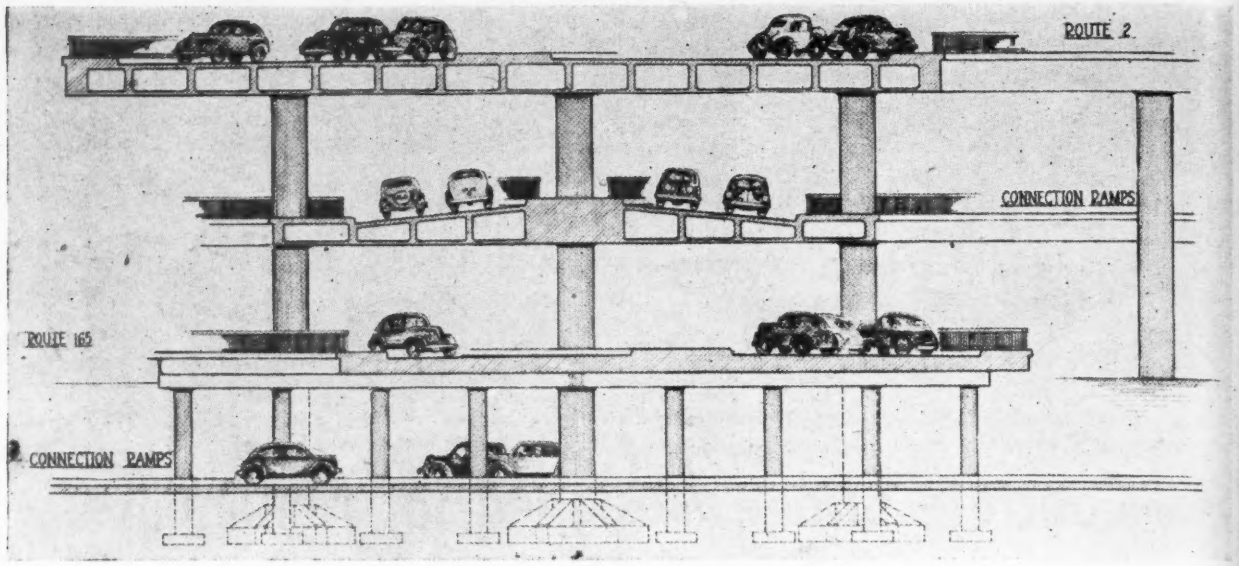
The slab was designed 16 inches thick and arched from the abutments to the center of the center span, with a 12" concrete curb rail and a wood side rail. The piers were of pedestal type (posts) with a concrete beam connecting the tops of the posts. One abutment was a pedestal type similar to the pier, and the other abutment was steel "H" piling with a concrete cap cast on the top; this type having been adopted because a railroad track was located within 20 feet from its center to the abutment, and a concrete abutment at this location would have required deep excavation and the supporting of the track.

The quantities involved in the contract price are as follows:

Concrete—Superstructure	97.3	cu. yds.
Two piers	29.7	cu. yds.
One abutment	14.3	cu. yds.
One abutment	6.5	cu. yds.
4 wing posts	1.8	cu. yds.
Reinforcing steel	24,245	lbs.
7 steel "H" beams 25'-0" long		
Excavation	162	cu. yds.
Channel excavation	475	cu. yds.

In this contract was included the clearing of the channel for 20 feet each side of the center of the span across the stream to its bed. The material from this excavation was placed in front of the abutments 3 ft. thick at the top, which was 2 feet below the bottom of the slab, and sloping 1½ : 1 to the stream bed. After the contract had been completed, this berm was riprapped with stone laid in horizontal layers extending from the back face of each abutment at a point 2 feet below stream bed, and around the face. This was done by force account, cost plus 15%.

C. B. Taylor was the contractor, Frank W. Arneson was the county engineer. Design was by the Iowa State Highway Commission.



Cross section sketch of 4-level structure showing traffic on two major highway routes and interchange ramp connections crossing at one point.

Four-Level Grade Separation for Los Angeles Parkways Intersection

At intersection of two main highway routes, this design is thought to eliminate objectionable features of the clover-leaf and other types. The intersection structure is 69 ft. high.

By S. V. CORTELYOU
District Engineer, California Division of Highways

THE City Engineering Department of Los Angeles, Calif., and the State Division of Highways have been engaged for months in a study of the development of plans and designs for parkways in and near that city; one of the most difficult features of which is the intersection of State highway routes 2 and 165. Route 2 is a main thoroughfare from San Francisco to San Diego and traverses the heart of Los Angeles, where it is known as the Hollywood Parkway. Route 165 extends from Pasadena through Los Angeles to San Pedro, being called Arroyo Seco Parkway from Pasadena to its intersection with the Hollywood Parkway, and as the Harbor Parkway from here to San Pedro. This intersection, at the westerly fringe of the Los Angeles Civic Center, will be the most intensely used interchange point in the entire parkway network, and received special study, which resulted in the development by the State Highway engineers of an entirely new type of grade separation and interchange system.

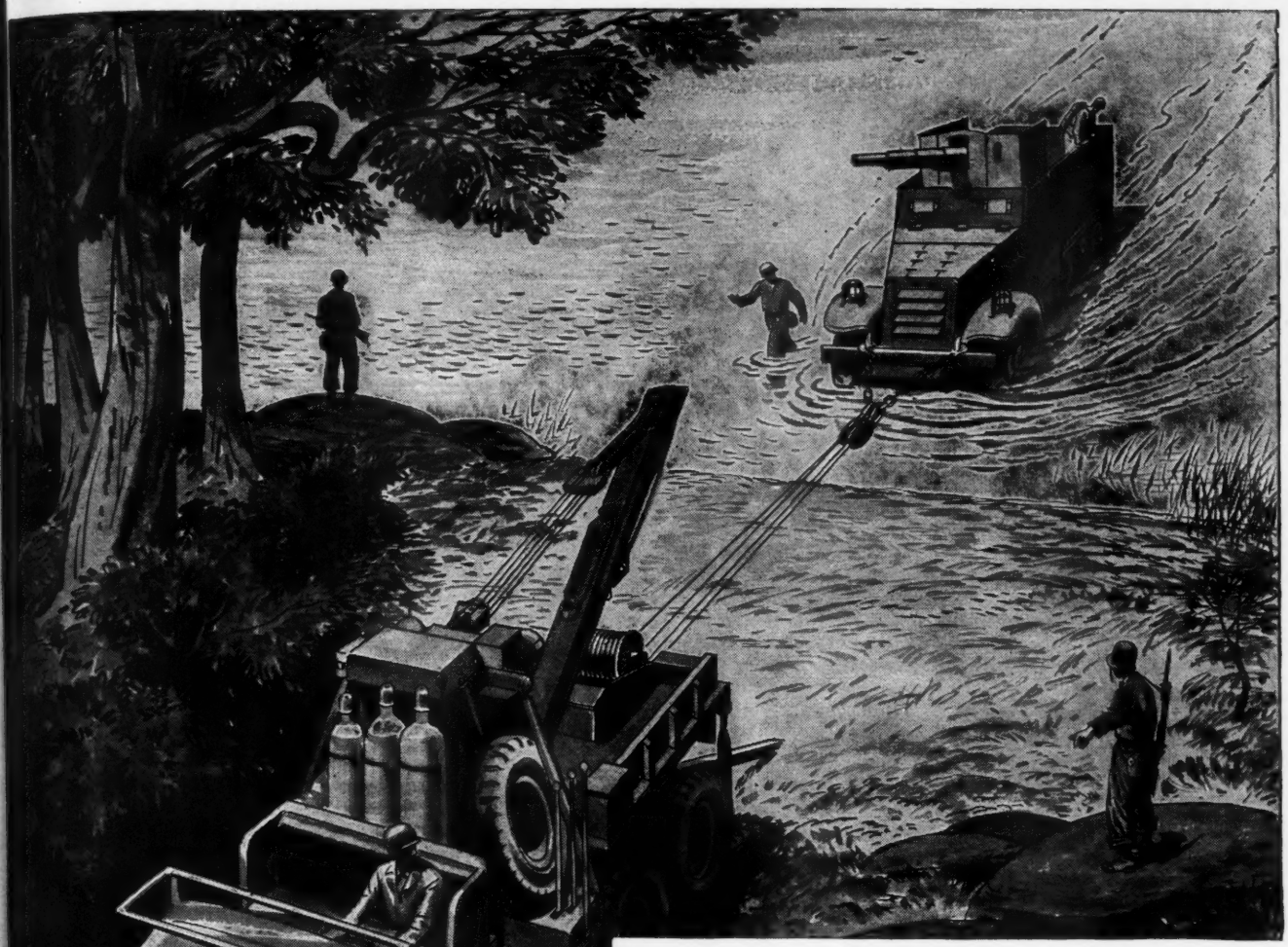
This new interchange system has been designated as a "Four-level grade separation" and embodies unusual features designed to increase safety, to reduce traffic confusion, and to decrease travel distances for interchange traffic movements between Parkways.

The plan of the intersection clearly indicates that the method of handling exchange traffic between the two parkways is greatly simplified in comparison with the conventional types of interchange systems, as, for instance, the clover-leaf type in which the left turn is accomplished by means of a three-quarter of 270° loop to the right. In the clover-leaf type there is also an overlap of acceleration and deceleration traffic with resulting conflict and confusion. Other types of exchange systems employ reversing curvature and circuitous travel for some of the traffic movements together with numerous bridge structures, all of which are detrimental to smooth and economical operation.

The four-level grade separation eliminates these objectionable features by providing a simple turn for all traffic movements, in the direction in which each wishes to go and without excess distance over that which would be required in ordinary highway travel. It will be noted that the take-off from one parkway and junction with the other is in all cases made on the right side of the parkways, which is considered desirable on express type roadways.

In the four-level grade separation the basic feature is that the four separate roadway levels are so arranged as to pass one another at one point in a single bridge structure. The two major parkways intersect one another at approximately a right angle and on different levels, while two pairs of interchange roadways occupy a level each in positions bisecting the quadrants made by the main parkway crossing.

The lowest level is for the two 26-foot one-way roadways which handle the connections from the Harbor-Arroyo Seco Parkway to the Hollywood Parkway. The second level is the Harbor-Arroyo Seco Parkway which is a six-lane freeway with central dividing strip.



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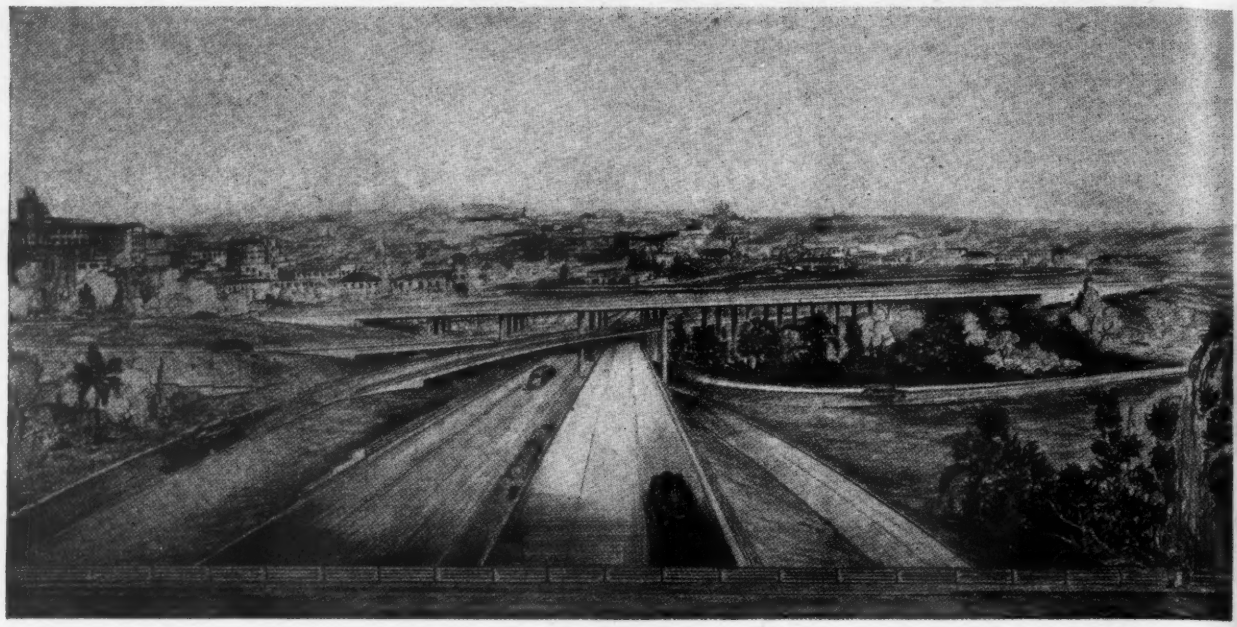


Artist's sketch of proposed 4-level grade separation in Los Angeles of State Highway 165, Arroyo Seco-Harbor Parkway, shown as the broad six-lane divided highway in center of picture and Route 2, Hollywood Parkway, crossing the picture at top level. The other roadways are traffic interchange connections with the two major arterials.

The third level is for the two 26-foot one-way roadways handling exchange from the Hollywood Parkway to the Harbor-Arroyo Seco Parkway. The fourth or highest level is the Hollywood Parkway, a six-lane freeway with a 34-foot central dividing strip.

The resulting bridge structure is 69 feet in height from the lowest roadway to the highest roadway, of which about 47 feet will extend above the natural ground surface.

Advantage has been taken of the ground contours in working out the design. The lowest level will be depressed about 22 feet below natural ground surface, which is the limit to which it can be lowered and still obtain drainage by gravity flow to connect with the storm drain system. The second level, the Harbor-Arroyo Seco Parkway, will be at approximate ground surface. The third level is elevated in a manner similar to an ordinary overpass. The highest level, the Hollywood Parkway, is on a supported grade with a smooth profile which meets the higher ground on each side so that the resulting effect will be natural and pleasing.

Material for the approach fills is available from surplus excavation easterly on the Hollywood Parkway project, where the parkway is depressed for a considerable distance so that important city streets in the Civic Center region may remain at present grade.

Alignment standards are excellent on both parkways, being on tangent at the bridge site with easy curvature adjacent. On the connections the lowest level roadways are on tangent through the four-level structure with adjoining curvature radii of 350-450 feet, and 400-400 feet which will provide safe speeds on the interchange of 35 miles per hour or better.

The third level connecting roadways are both on 300-foot radius curves with safe speeds of 35 miles per hour. These curves would have had slightly longer radius except for an important obstruction in the form of a large school building where clearance is limited. While of shorter radius than the lowest level connection roadways, these curves are elevated and therefore have ample sight distance clearance.

Grade systems are good throughout, and meet requirements of design speed of 60 miles per hour on the parkways and 35 miles per hour at the interchange roadways. Near the bridge structure the Hollywood Parkway has a maximum grade of about 3 per cent, while on the Harbor-Arroyo Seco Parkway the maximum is a short stretch of 4.5 per cent grade. On the exchange roadways the grade varies.

The grade system demanded special care and study in its development largely on account of existing major streets on all sides of the four-level structure, which themselves required grade separations with the freeways and with the connecting roadways. These limitations made necessary a very careful adjustment of all grades and positions, since grade and alignment are interrelated and each affects the others.

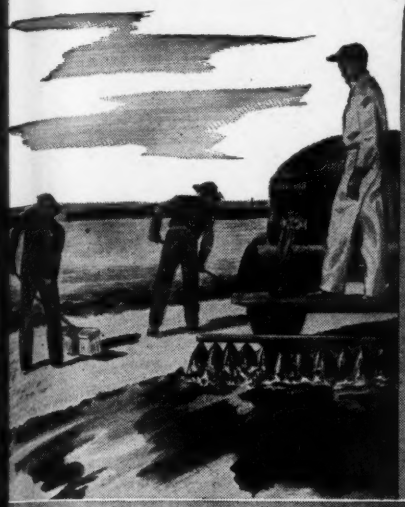
It is proposed to construct the four-level bridge of reinforced concrete as this material will lend itself better to architectural treatment than would structural steel. The use of reinforced concrete will also be consistent with other nearby structures planned for the parkways. Reinforced concrete design requires a slightly higher over-all structure due to the greater depth of girders and floor system which is required, but the small increase in total height is not considered objectionable.

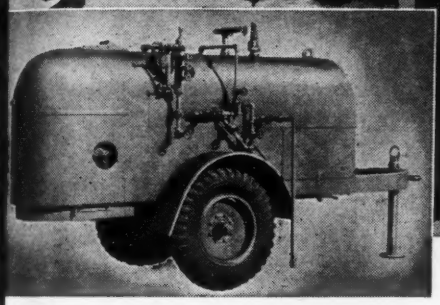
The different levels of the bridge all show the influence of superelevation and the grade of the roadways which they carry or bridge, and in the final design these effects will be softened by proper architectural treatment of the soffit lines.

The structural design of the four-level bridge is based upon the use of nine main columns to carry the vertical loading which will be symmetrically placed and will extend from footing to the highest level, supporting the bridge decks of all levels except the lowest which is on the ground. The minimum vertical clearance for all roadways is held at 15 feet and horizontal clearance will be provided between curbs and columns.

It will be noted in the plan that the length of deck on the highest level bridge carrying the Hollywood Parkway obviates the necessity of using excessively

(Continued on page 34)





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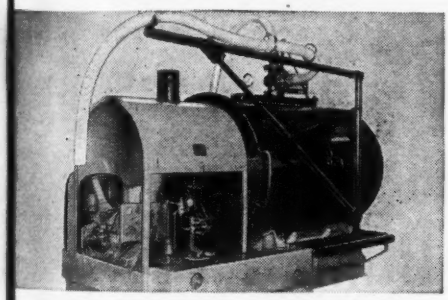

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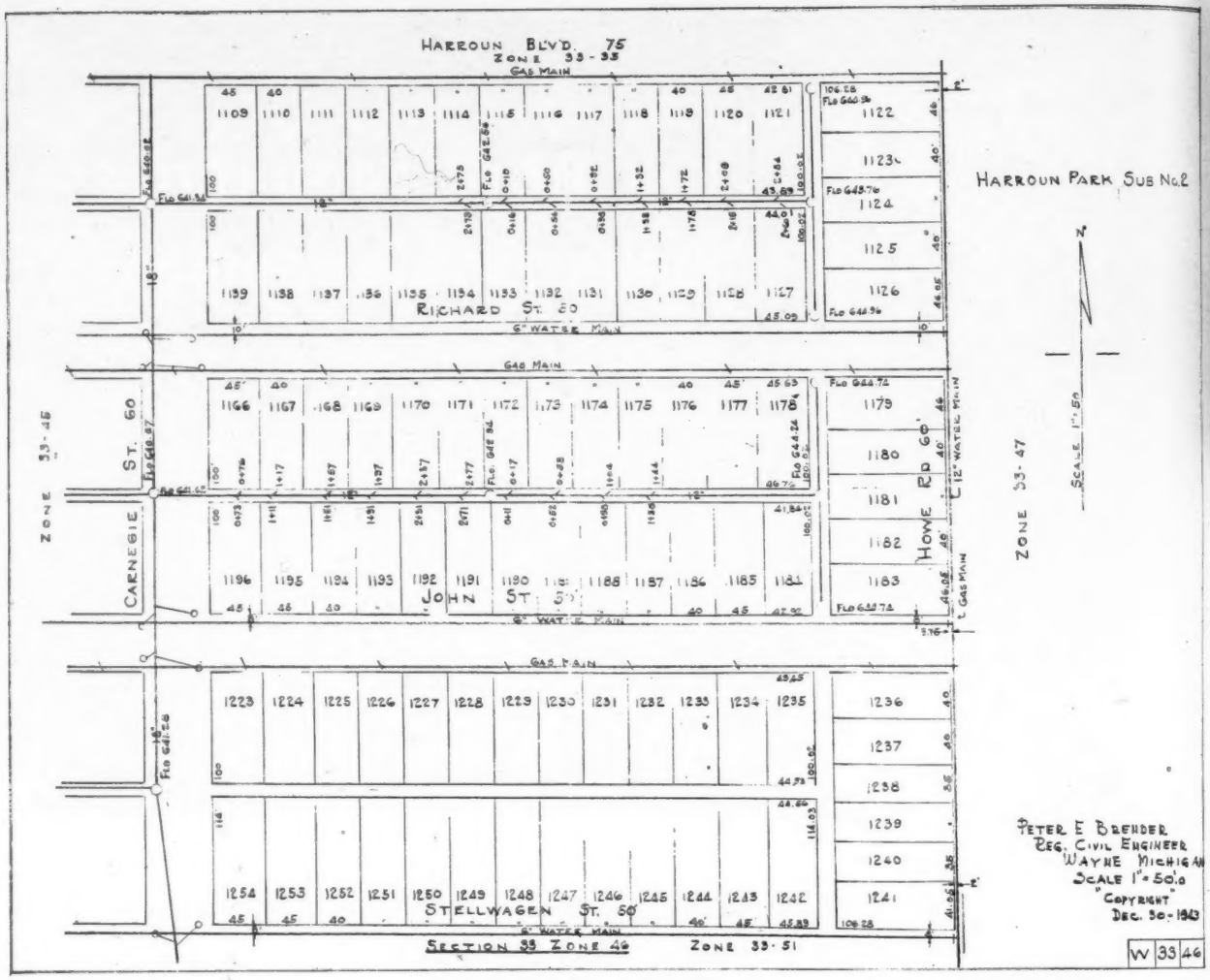

Map of area in Section 33, Zone 46.

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By PETER E. BRENDER
Engineer, Wayne, Michigan

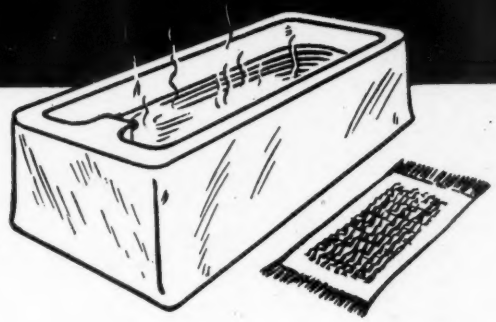
THE writer has recently been connected with the design and planning of sewer and water facilities for a few local governmental units, most of which do not have an official record of such facilities or a method for setting up such a record. Because of this lack of records in the existing systems, and the necessity of setting up records in the areas which are installing these facilities for the first time, the writer has endeavored to set up an adaptable system, which can be expanded. The areas involved are rather small at present, but as these communities grow and the systems are extended, or as one area may be annexed to another governmental unit, the need for this expansibility will become more evident. Two entirely separate areas which were both using this system of records could be joined and their records would fit each other and be incorporated into one system with a minimum of labor and expense.

With these requirements confronting us, we have devised a method wherein the principle of land surveying is used as the basis of determining divisions and of recording locations within such divisions. A section of land is the starting area. Divide each such section into 64 zones, each 660 ft. square. This makes possible a system of numbering that can remain unchanged, even though annexations take place, or streets may be opened or changed, etc.

No duplication of numbering will occur,—there will

*Copyrighted by Peter E. Brender, December 30th, 1943.

If 130,000,000 Americans took a Bath on the same Saturday Night!



To say the least, **it would be a strain on the drain!**

Seriously though, the problem of adequate pure water supply in the present, and in the future with possible population shifts and industrial readjustment, is one which concerns all of us who are associated with the water and sewage fields.

So much has been said of "Blueprint Now" that unless we are all on the alert, the facts which this slogan expresses may be lost. And if they are lost, many of us may face a hectic post war existence.

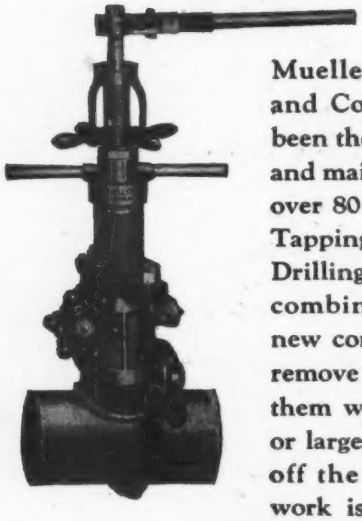
As a manufacturer whose effort is centered around the problem of sanitation, Simplex Valve and Meter Company is not interested in "force feeding" anyone into buying before he needs to buy; our interest is in extending to you the full facilities and experience of our company toward the end that your planning will be simplified and completely to your desires. Don't hesitate to get in touch with us.

Write today for further information and details of installation of Simplex "TG" Insert Venturi Tubes.

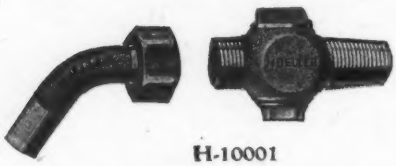
SIMPLEX VALVE & METER COMPANY
6750 UPLAND STREET, PHILADELPHIA 42, PA.

TOUGH AS A RHINOCEROS

ALL *MUELLER* TOOLS AND EQUIPMENT ARE BUILT TO LAST!



Mueller Tapping Machines and Corporation Stops have been the answer to installation and maintenance problems for over 80 years. The "B" Water Tapping Machine does both Drilling and Tapping with a combination tool. It inserts new corporation stops or will remove old ones and replace them with new ones of equal or larger size without shutting off the water supply as the work is done with the main under pressure.



H-10001

Mueller Corporation Stops are made in many styles and sizes to meet any requirement. For over three-quarters of a century, water works men have been specifying MUELLER Stops and using MUELLER Equipment to install them. It has been their method of lowering installation and maintenance costs.

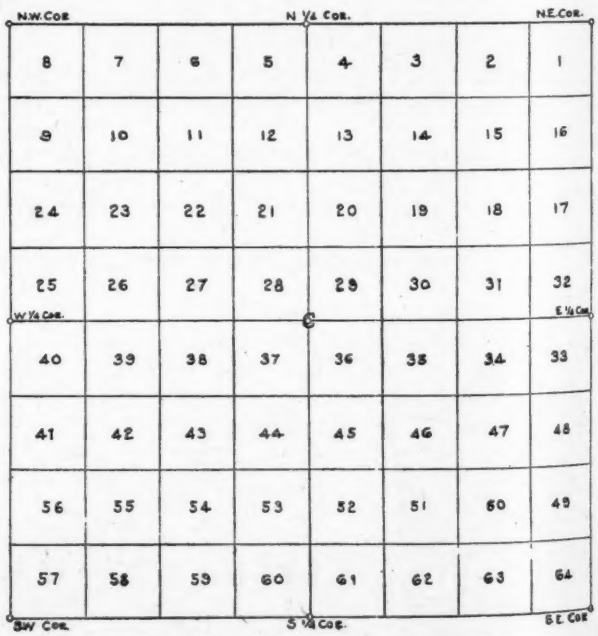
MUELLER CO.
DECATUR, ILLINOIS

***When writing, we will appreciate your mentioning* PUBLIC WORKS**

be, for instance, one and only one Sec. 20 Zone 64 in the entire township, so that notation locates a point at once within an area 660 ft. square. Each such zone is platted on a separate sheet 18" x 24" at a scale of 50 ft. per inch. Subdivision information taken from recorded plats is entered on each of these sheets, starting at section corners and ¼-section corners, and platting North or South, East or West as is done in land surveying. Thus all errors or discrepancies in the zones come at the midway points between ¼-section corners or as they occur in land surveying or property records.

This provides a sheet on a large enough scale to enable us to enter all pertinent information, such as name of Subdivision, legal description of the land included within the zone, street widths, location of water lines, sewer, gas, corporation cocks, telephone and power lines, surface drainage, and any other surface and underground data needed by the administrative office, the engineering department or the repair crew. By using 10 ft. of distance as a digit unit, as in house numbering, an Account No., Tap No., Job No., or Meter No. may be established by the engineering department when the application for water and sewer is made. This installation becomes an individual unit with a distinctive number so determined that taps can be added and removed anywhere in this area without affecting the identification number of any other installation. It can further be assigned to the proper record by an identifying initial prefixed to the number. Thus Sec. 35 Zone 64 house number 3764 (in Sec. 37) becomes W 35-64-3764 if it is a village account, or N 35-64-3764 if it is a township account, subject to the rate in the Village of Wayne or Nankin Township as the case may be.

Thus all confusion is avoided even in a section, part of which is within the Village of Wayne and part without. If later this area outside the village should be annexed, the records of all installations within the area could be shifted with no change except in the prefixing initial. If an area now in acreage should be subdivided, all information needed to incorporate the area into existing records can be placed, and the Zone plats and numbers assigned for each service installed without disturbing or duplicating any previous num-



Typical section; 64 zones, each 660' x 660'.

IMPORTANT

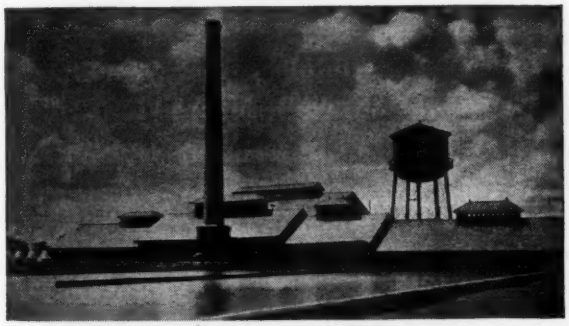
Public Health must be maintained!

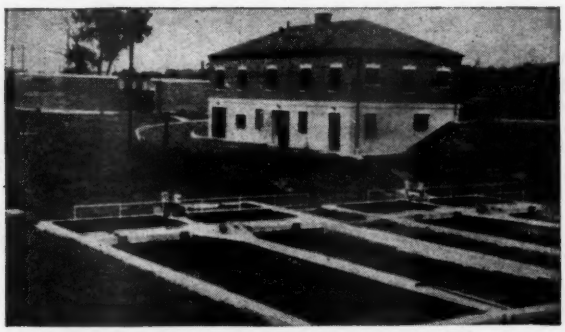
The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.





★ FOR WATER WORKS

1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.

★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

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When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

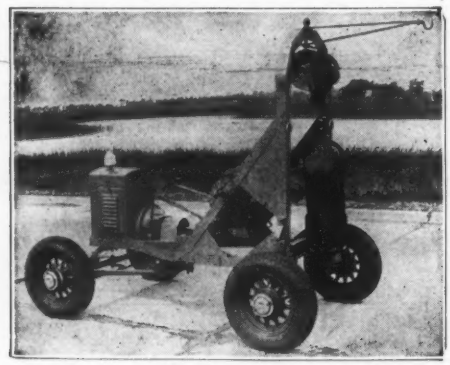
WHEN THERE'S NO TIME FOR BREAKDOWNS IT'S TIME TO GET A GORMAN-RUPP PUMP

Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders—you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog—no shut-off valve to jam—no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stocked for immediate delivery in 100 principal cities.

GORMAN-RUPP SELF-PRIMING CENTRIFUGAL PUMPS

THE GORMAN-RUPP CO. Mansfield, Ohio

KEEP THOSE SEWERS OPEN!



Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

You positively can keep the sewers of your city open with an OK Champion—the cleaner that does the entire job from street level. Dig-ups practically a thing of the past.

Three Distinctive Models Available. Write Now for Literature.

CHAMPION CORPORATION

4752 SHEFFIELD AVENUE, HAMMOND, INDIANA

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bers. As time goes on, and as facilities are expanded, hydrants, valves, etc., installed, catch basins and leads added and connected, this information is recorded on the plats. Thus a history of all installations is written in the records, enabling the superintendent or an employee unfamiliar with the installations to determine the location of some patricular detail needing repair, when an expensive repair crew needs to make emergency repairs at 2 a.m. some morning.

These same account numbers may be utilized to serve as a guide for meter reading, billing, etc., by prefixing A-B-C-D, or other prefix, each denoting a three-month account period. If it is necessary to change meter reading or billing due to growth in the number of accounts included in a billing period, this can be done at will to fit meter reading routes or other changing conditions.

In a growing system a billing machine and a ledger card should be used, but if a system is just being set up and not in position to purchase a billing machine at once, these records can be made on cards as supplied for a billing machine, so that when the purchase is a possibility the records will be usable without having to copy all established accounts from a bound ledger book.

The accompanying charts and maps show a sample sheet of records, giving all data pertaining to any individual account and the service for which it is rendered, the facilities which it provides, etc. This method of records is at a scale of 50 feet per inch, which makes possible the platting of all detail on a small sheet—requiring 64 zones or sheets per Section or 2304 sheets per township. By showing all underground detail on one record, much interference and utility damage would be eliminated and over a period of years the cost of such record would be a minor item. The Nankin Township records will be set up according to this system, with the hope that they will result in uniformity in the records of the adjoining areas.

Four-Level Grade Separation for Los Angeles Parkways Intersection

(Continued from page 28)

high retaining walls. The use of retaining walls can not be entirely avoided but the design has been worked out so that there will be a minimum of wall and those required will not exceed 20 feet in height.

The four-level grade separation, which is believed to be a forward step in highway design, is a development of an idea first suggested by District Location Engineer W. H. Irish. It is a design applicable to other sites, furnishing a compact, efficient and safe traffic exchange system, superior in many respects to most systems now in use, and at comparable cost where conditions justify this design.

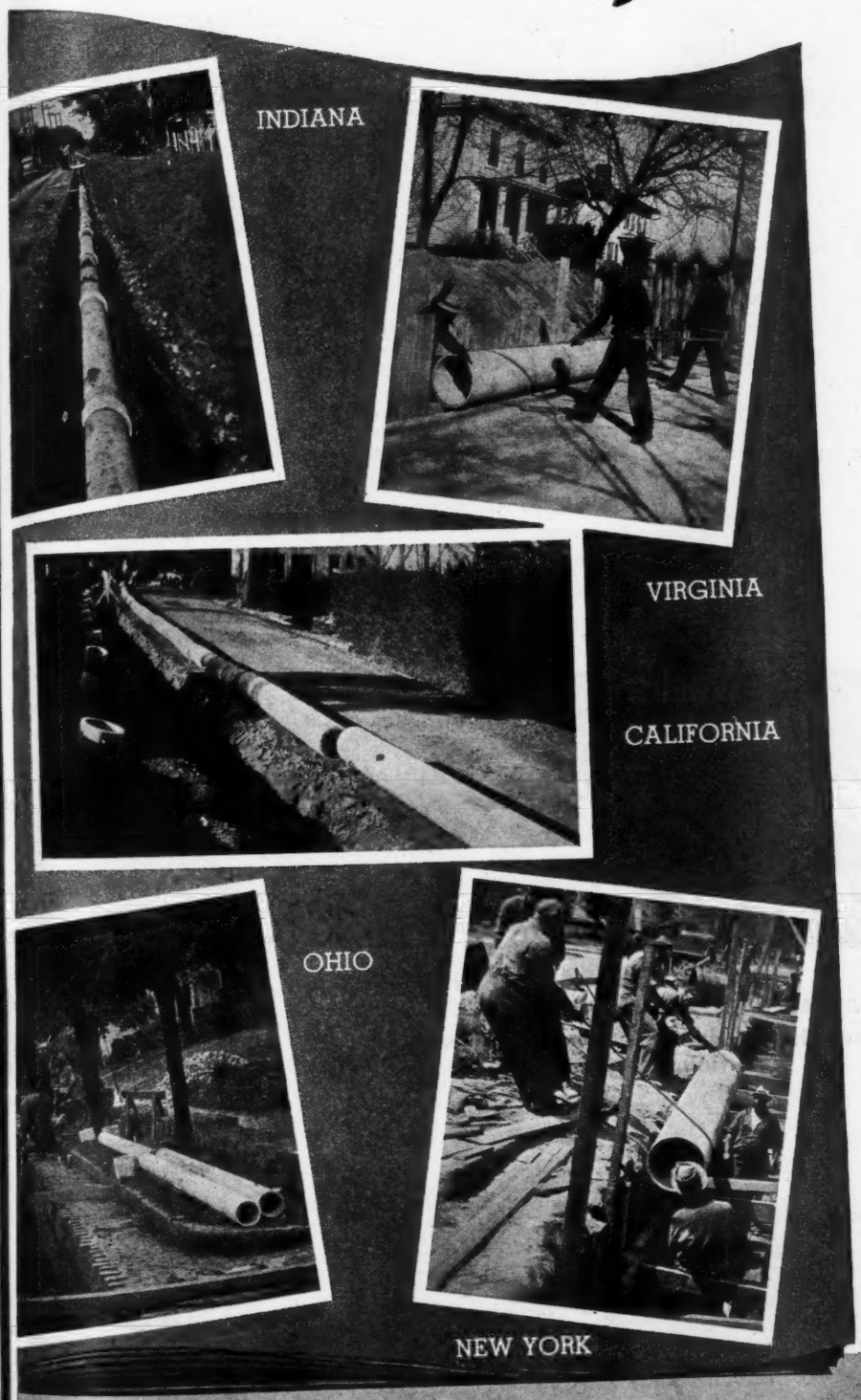
The above is slightly condensed from an article in *California Highways and Public Works.*

Rodent Control on Garbage Dumps

The California Department of Public Health, during April, investigated 60 garbage dumps scattered throughout the State and it was determined that rodent control measures are now in effect on most of them. Most dumps are thoroughly burned over or covered with earth. Special assistance was given to the officials of Richmond in conducting poisoning and trapping operations in the area surrounding the city garbage dump. Rat trapping operations were conducted by State field units in 15 communities of the State.

Transite Pipe Album

OF EFFICIENT, LOW-COST INSTALLATIONS



JOHNS-MANVILLE'S FILES contain literally thousands of photographs of Transite Pipe installations. In cities, towns and villages. In every state in the Union. Impressive visual evidence of the nationwide acceptance for the asbestos-cement pipe that offers these important advantages:

Easy Handling. Light-weight Transite Pipe requires fewer men for handling. Only the larger sizes need mechanical handling equipment.

Rapid Assembly. Even unskilled crews form tight joints easily, quickly with the Simplex Coupling.

Tight, Flexible Joints. Wide sweeps can be made with straight lengths because the Simplex Coupling stays tight even when the line is deflected as much as 5° at each joint.

Low Maintenance. Transite's corrosion-resistance and maintained strength contribute to its low maintenance costs.

Tuberculation No Problem. Non-metallic in composition, Transite cannot tuberculate. Its initial high-flow coefficient (C=140) can never be reduced by tuberculation.

Get the complete facts today by writing for Transite Pipe booklet TR-11A. For details on Transite Sewer Pipe for more efficient sewage disposal systems, ask for TR-21A. Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Transite Pipe is Again Available for Prompt Shipment

Asbestos **TRANSITE PIPE**

FOR EFFICIENT, ECONOMICAL WATER AND SEWER LINES

Surfacing Streets With a Shortage of Labor

By W. L. GILLUM
City Engineer, Washington, Mo.

WASHINGTON, MISSOURI, is located on the south bank of the Missouri river 51 miles west of St. Louis. It has a population of 7,000 and its industries have a payroll of more than $2,000,000 a year. The citizens have always demanded serviceable, if not high-priced streets, and more than thirty years ago the city began oiling its macadamized main streets, gradually extending the oiling to the residential dirt streets; and in 1940 it oiled and covered with torpedo gravel nearly 18 miles of both dirt and macadam streets. Two miles of its streets are paved with concrete and half a mile with rock asphalt.

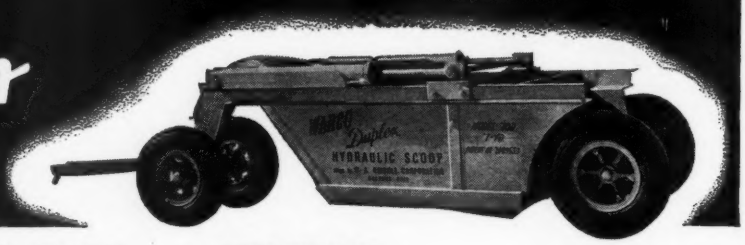
Practically no oiling was done in 1941 and 1942 and the streets began to show urgent need of repairs and surfacing. In January 1943, with no road oil obtainable due to the war, the writer recommended to the City Council that we attempt surfacing the entire 18 miles with other bituminous material while it was still obtainable. Application was made immediately through the State Highway Department to the Federal government for various types of cutback asphalts and PWA approved the 103,000 gallons requested.

It rained constantly until June 15, and the time then remaining suitable for asphalting was short, for many of the streets were to be prepared for asphalting by first scarifying, maintaining and rolling them. Labor for doing this was scarce and high-priced, but by using labor-saving devices and giving to the Missouri Petroleum Products Co. the contract to furnish and distribute the asphalt, the entire project was finished in good time. The equipment used included a cheaply constructed gravel bin holding approximately 100 tons of torpedo gravel, so located that the gravel could be dumped into it from the street above by large trucks used by contractor Edward Rau in hauling from the gravel pits at Pacific, Missouri. The city's three two-yard trucks were loaded from the bin by gravity within five minutes when backed under the 8" cast-iron main leading from the bin above. A 10-foot wide Buckeye trailer spreader was instantly snapped on behind the trucks and the torpedo gravel was spread as required. One or two men with brooms cleaned away the overlapping gravel, after which a 10-ton Austin-Western roller imbedded the gravel in the asphalt.

All work was blocked off for at least twenty-four hours, using wood barriers and string or wire with red tags strung on it.

With this equipment and service we were successful in distributing 103,000 gallons of cutback asphalt and approximately 3750 tons of torpedo gravel. The amount of material used varied in amount, depending upon whether the street was oiled dirt, penetration asphalt, oiled macadam or rebuilt asphaltic concrete. The front foot cost varied in the same manner, being, in the different streets $0.085—$.114—$.115 and $.238.

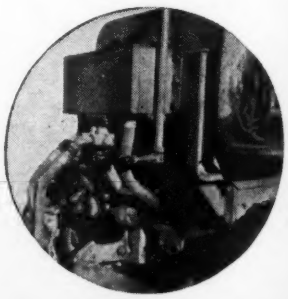
The WARCO Duplex HYDRAULIC SCOOP



SPEEDY • ECONOMICAL • DEPENDABLE
ADAPTABLE • UNUSUAL SIMPLICITY
It loads, hauls, dumps or spreads in one continuous cycle.

Two lines of hydraulic hose connect scoop to tractor and two hydraulic rams do all the work. No overhead cables or frames obstruct shovel, dragline, or bin loading.

The two lines of hose connect to a simple hydraulic control unit on the tractor. One lever in the hand of the operator controls all scoop operations.



W. A. RIDDELL CORPORATION, Bucyrus, Ohio

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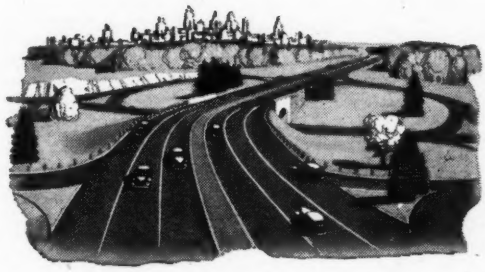
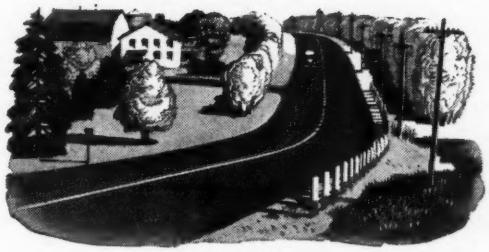
Quiz for road builders



Question: *How many miles of main trunk highways in your district?* _____ *What was the average cost per mile?* _____

There are 331,624 miles of main trunk highways in the U. S. Federal and State highway systems. The cost of building inter-regional traffic arteries ranges upward to $175,000 and more for a mile of super-highway.



Question: *How many miles of paved secondary roads in your district?* _____ *What was the cost per mile?* _____

There are 1,055,000 miles of surfaced secondary roads in the United States. Of this total, less than one third is actually *paved* mileage—yet adequate bituminous paving can be laid for as little as $5,000 per mile.

Question: *How many miles of unpaved roads in your district?* _____ *What mileage of post-war paving is planned?* _____

There are 1,547,000 miles of unpaved, unsurfaced county and local roads in the U. S. network. More than half of the entire mileage is still in the mud—yet from 10 to 40 miles of these roads can be paved for the cost of a single mile of main trunk highway.

So what?

Simply this: We believe that the answers to these questions are the best possible advertisement we could write on the use of Barrett Tarvia in your post-war plans for a well integrated highway system serving the interests of *everybody* in your community.

For there is a right grade of Tarvia and a right Tarvia method for almost every type of highway construction. Tarvia roads are built largely with local labor and local materials. Tarvia provides maximum mileage of clean, skid-safe pavement for the people in your community, county or state.

Why not call in the Tarvia field man?

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

New York . . Chicago . . Birmingham . . St. Louis . . Detroit . . Philadelphia . . Boston
Providence . . Rochester . . Minneapolis . . Cleveland . . Columbus . . Toledo . . Youngstown
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Barrett Tarvia*

*Trade-mark Reg. U. S. Pat. Off

When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

Twenty-two

Reasons Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
- Minimizes Panning
- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place — Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab

***FLEX-PLANE** joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.*

• Ask for Equipment Specifications •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U. S. A.

When writing, we will appreciate your mentioning **PUBLIC WORKS**

Laying a 24-Inch Water Main Under 26 Feet of Water

By F. G. HOCUTT, City Clerk

The water supply of the city of Tuscaloosa, Alabama, is obtained from an artificial lake which is nine miles from our filter plant. The Black Warrior river lies between this lake and the filter plant and the city, and it was necessary, in piping the water from the lake to the filter plant, to put the line across the bottom of the river. This line, which was laid a number of years ago, was the only connection between the lake and the filter plant and the city felt that, as a safety measure, we should have a duplicate line across the river to take care of an emergency in case the original line should break, and a 24" line was constructed recently.

At the point where it crosses, the river is approximately 500 ft. wide and 26 ft. deep. The river is navigable and a number of boats go up and down it every day. In making soundings of the river bed we found that most of it was solid rock and fairly smooth but for several feet next to the bank on each side of the channel it was quite irregular.

We had on hand enough 24" Universal pipe to use on the smooth bed of the river but it was not practicable to use this pipe on the irregular portions and we purchased approximately 300 ft. of pipe with "Uniflex" joints to use there, deciding that it would be cheaper to purchase flexible-joint pipe than to dynamite the irregularities in the rock. The use of this pipe proved to be perfectly successful.

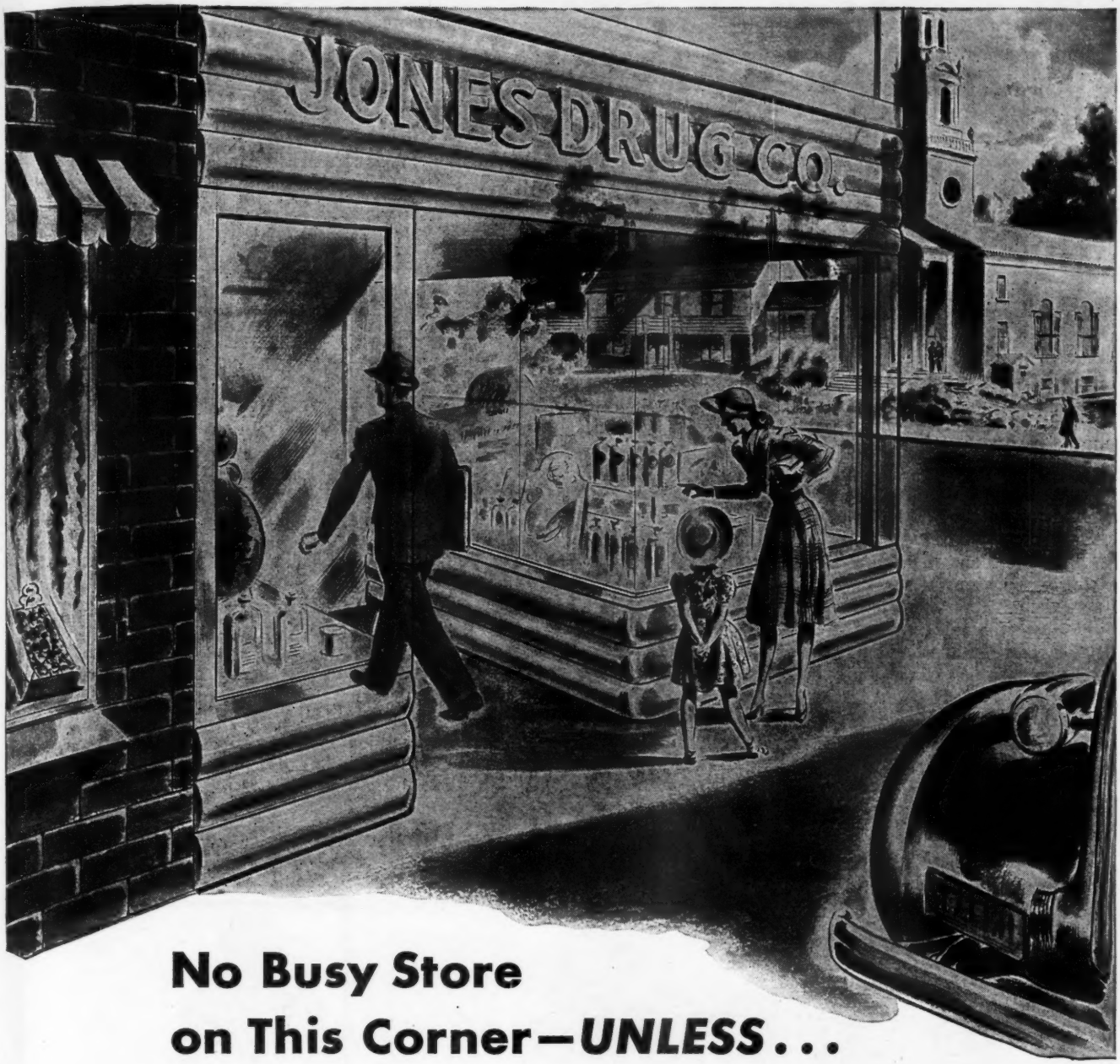
All the pipe was assembled on one bank of the river and connected in lengths of approximately 50 ft. We rented two trucks equipped with skidders and placed one on each side of the river. Also we rented three barges from the Baker Tow Boat Company to use in connection with the work.

The cable from the skidders on that side of the river opposite to the one on which the pipe was assembled was brought across the river and attached to the first 50-ft. section of the pipe, which then was pulled into the river alongside one of the barges and tied to it with a chain block adjusted to keep it about 15 ft. under water to prevent interference with river traffic. The Universal pipe would float but the flexible-joint pipe would not, and it was necessary to support it above the bed of the river by means of the barges until it had been drawn all the way across. As each 50 ft. section was brought into the water another section was added to it until the project was completed.

When the line had been brought entirely across the river we filled it with water and sank it. Sacks of cement were used to block it up where the bottom was irregular. A diver was employed to walk the line and see if it was in good condition on the river bed and that all the joints were tight. He found only one joint leaking and tightened it.

It required about two weeks to complete the job, which was done with our waterworks maintenance crew. As none of these men was experienced in this type of work and our equipment was very crude, the work went very slowly.

W. H. Nicol, Commissioner of Finance and Water Works of the city, was in charge of the project. He is a civil engineer and made the soundings of the river and a profile of same. The success of this project can be attributed to his work and that of Roy Terry, an assistant in the Water Works Department.



No Busy Store on This Corner—*UNLESS* . . .

UNLESS . . . the people in your community have money to spend. Property owners must be able to build, and merchants must make a profit.

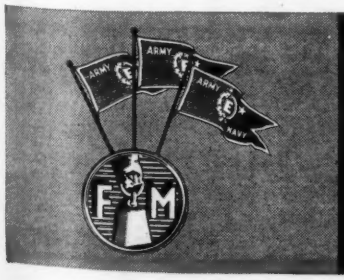
And none of those things can be, if the heavy hand of municipal taxes makes property owning, building, living, and business unattractive.

You can avoid such dislocation . . . you can encourage postwar development in your town by offsetting burdensome municipal taxes. You may even be able to eliminate those taxes completely.

This can be done with the earnings which a Fairbanks-Morse Diesel-operated Light and Power Plant makes possible.

Write now to get all necessary information—there is no obligation. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

BONDS PAVE THE WAY FOR V-DAY



FAIRBANKS-MORSE

DIESEL ENGINES
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WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

F M

Diesels

When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

Maintenance of Motors and Control Devices

What precautions to take against Dirt, Moisture, Friction and Vibration, the four principal causes of failure.

THERE are four principal causes of motor failure: *Dirt, Moisture, Friction* and *Vibration;* and to one or more of these four are due 90% of all motor failures.

Dirt

Dirt can be ordinary "under-foot" dirt that rises into the air when workers walk and trucks trundle about a plant. Also it can be metallic filings blowing into the motors of a machine shop, powdered chemicals (as in a water or sewage treatment plant), or other "matter out of place."

Dirt can plug ventilating spaces, interfering with proper cooling.

It can glaze the faces of commutator brushes, resulting in harmful sparking.

It can abrade slip rings, multiplying wear and blocking the full passage of current.

It can blanket windings, interfering with their proper heat radiation and causing dangerous temperature rises. If metallic particles are present, it can build up into a hazard of shorting or grounding. Eventually, if not corrected it can cause complete motor breakdown.

Precautions. These conditions will not occur if the following precautions are taken.

In the care of *totally enclosed motors,* tighten at regular intervals all exposed joints in the motor frame and motor brackets.

In the case of *open-type motors,* make sure that dirt is kept out of the bearings; that oil filler caps are always closed; that dust seals and gaskets are in good condition (be sure to replace them if they are worn).

Be sure to have plenty of clean rags on hand and at regular inspection intervals wipe off motor housings, clean commutators and slip rings and remove dust from the wound section. Use *rags,* not waste; waste contains lint, which adheres to the surfaces it contacts.

Once a month (oftener if necessary) blow out the windings with compressed air at a pressure of between 30 and 50 pounds—more than 50 lb. may loosen the insulation and blow dirt *under* it. If the dirt dis-displaced by blowing is objectionable, air suction should be employed.

Sometimes neither blowing nor suction will clean out a motor adequately, the accumulated dirt having

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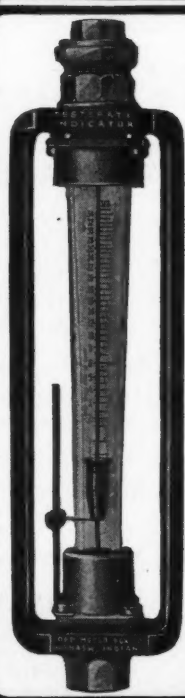

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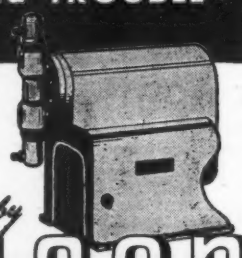

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remained long enough to unite with grease or oil and sticking. Then a solvent may be required to remove it. But this will not occur unless the motor has been neglected too long.

The three principal types of solvent in general use are petroleum distillates (which have the least corrosive action on insulation varnishes); a 50-50 mixture of petroleum distillate and carbon tetrachloride (used if the first is not effective); and, for extreme cases, straight carbon tetrachloride. While the second is not inflammable, its vapors combined with air may be explosive. The fumes of the third can be poisonous.

Moisture

Moisture soaks and softens windings until the insulation will no longer hold the voltage. Once inside the motor, it unites with any dirt present to form a sticky mass. It also absorbs acid fumes and alkali fumes present in the air and so becomes an actively destructive agent.

Precautions. Open motors should always be guarded against the accidental intrusion of water from drip or splatter.

Stand-by motors should be run a little at least once a week to guard against moisture condensation during periods of idleness.

Before motor windings are blown out, a check should always be made to make sure water has not condensed in the air line.

Friction

In motors with sleeve bearings, oil adheres to the shaft and is dragged along by rotation, forming a lubricating film which prevents friction.

Precautions. Use the right oil; in the right quantities; at the right intervals; following to the letter the lubricating instructions of the motor manufacturer. Don't add new oil while the motor is running; as some lubricant will then be riding the ring over the oil level, you may be fooled into adding too much oil. If you do that (unless the motor has the special protection of a solid sleeve bearing), excess oil is almost sure to escape and can do serious damage—deteriorate the mica insulating segments between the commutator bars, or foul the bars themselves; soak windings to the point where rewinding may be the only way to prevent burnout or breakdown.

In the case of motors with ball bearings, make sure the inner race is tight enough on the shaft to rotate with it but not so tight as to cause frictional distortion. Apply the right grease; in the right quantities; and exactly as the manufacturer directs. Don't overgrease. Excess grease promotes friction and consequent heat.

Vibration

If excessive vibration develops in a motor, parts can be shaken loose, electrical connections be broken, portions of the metallic structure be crystallized, and frictional wear of every kind greatly increased.

Precautions. Check frequently for misalignment; foundation settling, heavy floor loading, excessive bearing wear are among the possible causes of misalignment. Check to see if vibration in the driven machine is being transmitted to the motor; if excessive belt or chain tension may be at fault; or the push-apart effect inherent in spur gears. Check also for motor shaft oscillation resulting from a loose bearing or loose motor mounting bolts.

Having read the above, remember:

It isn't what we know that counts—it's what we *do* about what we know.

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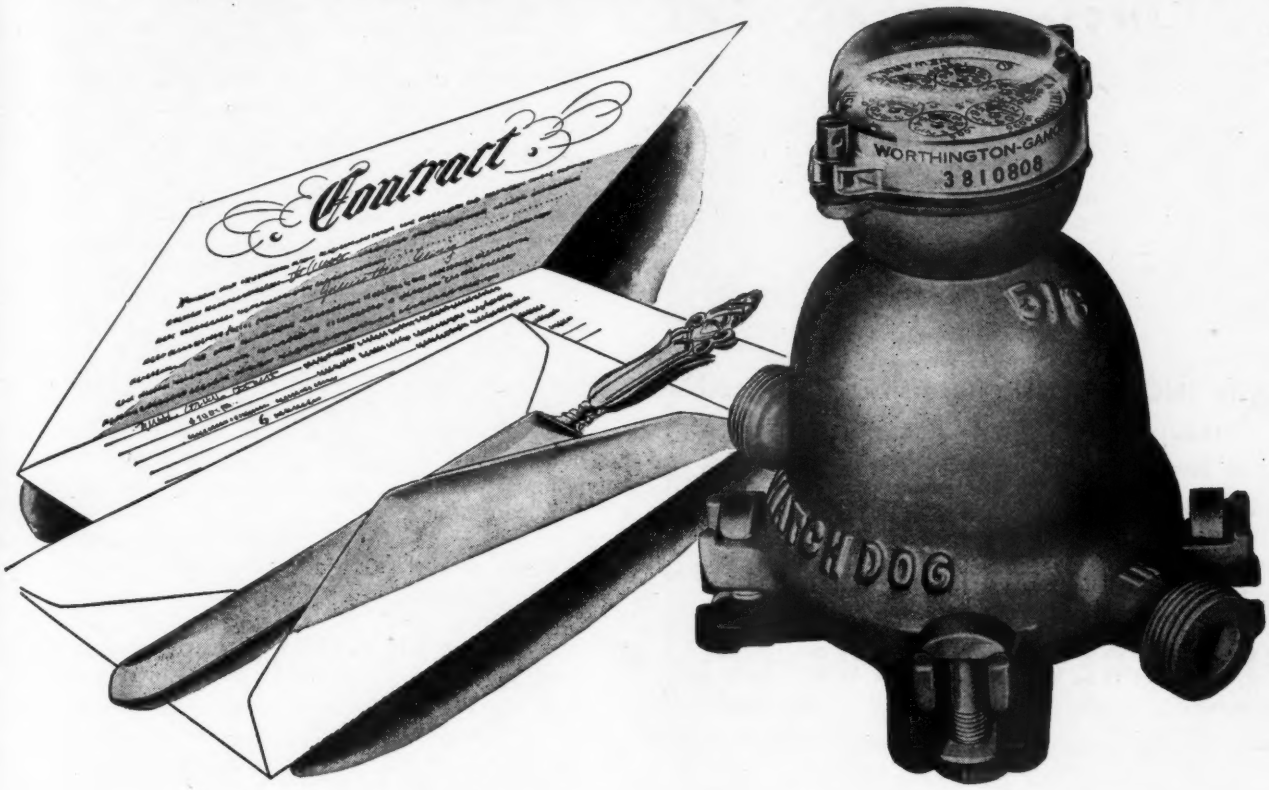

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No other water meter manufacturer maintains as extensive service facilities as Worthington-Gamon—24 district offices in 24 leading cities. Worthington water meter technicians and Worthington Research Laboratories will help you work out a plan for better, lower-cost metering.

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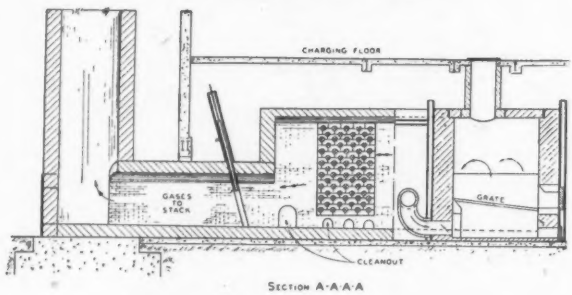

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Maintenance of Control Devices

Such devices include manual starters, magnetic starters, drum controllers, speed regulating rheostats, contactors, relays, and circuit breakers. The maintenance of these can be broken down into ten simple checks.

1. *Make sure all connections are tight.*

A loose contact surface offers high resistance to the passage of current, and heat is developed, which in turn causes increased oxidation of the copper; and this copper oxide, being a poor electrical conductor, still further increases the resistance and heat; and this vicious circle can continue until it melts the contacts.

If connections to overload relay heaters get loose and remain so, local heating results that can affect the whole calibration of the relay or even destroy it.

When a rheostat has been installed and put into operation, all connections should be checked at least twice to make sure they remain tight when heated. If they should become loose and remain so, the result can be burn-out and failure of the controlled equipment.

Even in the case of simple manual starters with quick-make and quick-break toggles, tightness testing is important; in fact, it is practically the only maintenance needed.

But once tight does not mean always tight. Changes in temperature, vibration, carelessness—any or all can cause connections to loosen again.

2. *Make sure all operating parts stay clean.*

A common way that they get dirty is by applying lubricant, which catches dirt and results in a sticky, gummy accumulation that causes sluggish action of the moving control parts. Lubricant should never be applied except to control devices completely immersed in oil (designed for high-voltage installations in explosive atmospheres or where corrosive fumes are present in the air); to drum controllers with sliding copper-to-copper contacts (whose contact parts should occasionally be lubricated with a thin film of vaseline or light oil, as should also the drum shaft bearings); and to magnetic line-starters (whose magnet sealing surfaces should be wiped occasionally with an oil-moistened cloth).

When dirt does accumulate, blow out the control periodically with clean, dry air under 30 to 50 lb. pressure. If that does not suffice, wipe or wash with a suitable cleaning fluid.

3. *Make sure the device stays dry.*

Moisture can cause grounds in the control device, and these can cause unexpected starts, prevent normal stopping, eliminate overload protection, impair operation.

To prevent these, heaters may be installed in the control enclosure, to be energized when the device is idle. (When it is operating, the normal heat of resistors and coils is sufficient.) Other preventive measures are elimination of moisture from conduits, and semi-annual or quarterly use of paint and varnish. If the air surrounding a device is saturated with moisture or carries corrosive gases, apply insulating varnish of the proper characteristics to the coils and protective paint to the iron parts.

4. *Look for the presence of copper oxide.*

If the contacts of a control device operate often enough, copper oxide coatings are prevented by a mechanical rolling and scrubbing action and the slight burning effect of a normal arc. If, however, an oxide coating develops, it causes high resistance. Such a coating may occur also at any one of the several

The chipped teacup of the PATRIOTIC Mrs. Jones

No matter who the guest—Mrs. Jones brings out her chipped teacup with no embarrassment. On the contrary, with a thrill of pride.

Not very pretty, that chip. But it bears witness to the fact that Mrs. Jones has her nation's welfare at heart.

Mrs. Jones has given up all unnecessary spending for the duration. By doing *without* —she is helping to fight inflation.

Maybe she doesn't know all the complicated theories about inflation. But she does know that her government has asked her *not to spend.*

So Mrs. Jones is making all the old things do . . . not only that teacup. She's wearing her clothes for another year—and another. She's not competing with her neighbors for merchandise of any sort.

And the dollars she's not spending now are safely put away (and earning interest) for the peacetime years ahead. *Then* those dollars will buy things that can't be had for any price today.

If we all are like Mrs. Jones, there will be no inflation with skyrocket prices. If we all are like her, dangerous Black Markets cannot exist.

A chipped teacup stands for all that . . . for a *sound, secure* U. S. A.

7 RULES FOR PATRIOTIC AMERICANS TO REMEMBER EVERY DAY

1. Buy only what you *absolutely need.* Make the article you have last longer by proper care. Avoid waste.
2. Pay no more than ceiling prices. Buy rationed goods only by exchanging stamps. (Rationing and ceiling prices are for *your protection.*)
3. Pay willingly any taxes that your country needs. (They are the cheapest way of paying for the war.)
4. Pay off your old debts—avoid making new ones.
5. Don't ask more money for the goods you sell or for the work you do. Higher prices come out of everybody's pocket—including *yours.*
6. Establish and maintain a savings account; maintain adequate life insurance.
7. Buy all the War Bonds you can—and hold 'em!

Use it up . . . Wear it out . . . Make it do . . . Or do without

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

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bolted joints of a contactor. These points can be located by the high temperature created. The oxide film should be removed from all such surfaces, using either sandpaper or a fine file—*not* emery cloth.

5. *Inspect Contacts for excessive roughness.*

A *moderately* rough contact surface (no rougher than coarse sandpaper) is just as good as a perfectly smooth one—possibly even better. But if large projections have developed, smooth them off with sandpaper or a fine file. If, however, the contact has worn down more than a third of its original thickness, or is badly pitted, or no longer compresses the spring, replace with new ones both the worn contact and its mate. Do not use one new contact and one worn one operating as a pair.

6. *Test for normal clearances and free working of moving parts.*

At regular intervals operate by hand all contactors and circuit breakers. If you note any binding or undue friction, find the cause and correct it.

7. *Test for firmness of contact pressure.*

A small contact with suitable contact pressure will carry more current than a large one with little or no pressure. If any contact spring is not in good condition—is damaged or has lost its temper—replace it.

8. *Inspect for frayed shunts.*

If a shunt is unduly bent, some of its strands may break, causing additional loading of the remaining strands. Also, in extremely corrosive atmospheres, shunts may fall apart without apparent warning. Damaged strands should be renewed.

9. *Inspect thermal relays for ambient temperatures surrounding their enclosures.*

Such relays are calibrated to operate at one definite temperature, and if the ambient temperature changes they should be readjusted.

10. *Make sure each control device is operating at rated voltage.*

Overvoltage can shorten coil life and cause excessive wear in contactors and relays. Low voltage can cause sluggish action, resulting in overheating and the probable welding together of contact tips.

The above has been prepared from information furnished by the Westinghouse Electric & Manufacturing Co.

Joint Sewage Treatment Proposed

Benton Harbor and St. Joseph, Mich., with populations of about 17,000 and 9,000 respectively, have agreed to plan for construction of a joint sewage treatment plant, estimating that this would cost $200,000 less than two plants for construction and $25,000 a year less for maintenance and operation. They also are considering construction of one airport to serve both communities.

Michigan to Enjoin Pollution of Lake St. Clair

The state of Michigan plans to file suit to enjoin five communities in the Grosse Pointe area — Center Line, Roseville, and St. Clair Shores, East Detroit, and Warren Township—from continuing to pollute Lake St. Clair with sewage. All five communities with aid of federal funds were connected with the Detroit sewer system, but only the first three named are now willing to pay the agreed cost of treatment at the Detroit plant. Because the sewage cannot be separated the county has closed the gate into the Detroit sewers to all five communities. The state supreme court is expected to grant the injunction following its decision in the Port Huron-Niles cases.

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So keep this one salient fact before you at all times: *The backbone of our vital war financing operation is your Pay Roll Savings Plan.*

Your job is to keep it constantly revitalized. See to it that not a single new or old employee is left unchecked. See to it that your Team Captains solicit everyone for regular week-in and week-out subscriptions. And raise all percentage figures wherever possible.

Don't underestimate the importance of this task. This marginal group represents a potential total sales increase of 25% to 30% on all Pay Roll Plans.

Constant vigilance, in a quiet way, is necessary to keep your Pay Roll Savings at an all-time high. Don't ease up—*until the War is won!*

The Treasury Department acknowledges with appreciation the publication of this message by:

PUBLIC WORKS Magazine

Back the Attack! SELL MORE THAN BEFORE!

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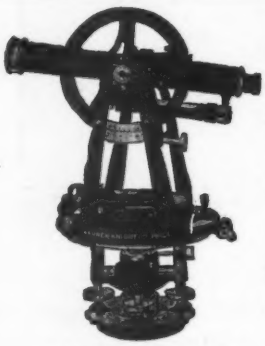

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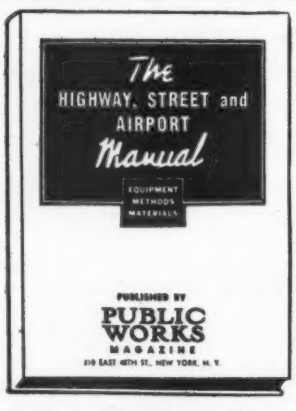

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PUBLIC WORKS, 310 East 45th St., New York 17, N. Y.

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Soil-Cement Repairs to a Runway

A midwest airport, started in the fall of 1942, was designed for a wheel load of 15,000 lb. Runway construction comprised a 6-in. compacted layer of A-4 topsoil for subgrade, covered with an 8½-in. layer of clay-gravel, and topped with a 1½-in. bituminous mat. The clay-gravel contained 50 per cent local hill gravel, 30 per cent river gravel and 20 per cent blow sand.

Due to heavy fall rains, the subgrade became wet and the base material saturated. War necessity demanded that construction proceed even though desired stability was not attained. To make the field serviceable, portland cement was mixed with the materials in the areas of poorest consolidation and recompacted. The result was good stability and the airport was put into service as planned.

During the following spring months, sections where cement had not been used began to show distress. Inspection by the engineers showed that there had been no failures in the sections where soil-cement had been used the previous fall and they decided to reconstruct the failing clay-gravel sections as soil-cement.

The job consisted of removal of existing bituminous surfacing, addition of a layer of river sand over the base to reduce the coarseness of the material, incorporation of cement, and soil-cement processing. A topping of bituminous material was to be added as a final surface.

A contract for this job, which included 185,000 sq. yd. of soil-cement, was let to Jay W. Craig Co., Minneapolis; the soil-cement construction being sublet to Reno Construction Co., Kansas City, Kan.; Wilson & Co., Salina, Kan., were architect-engineer.

Standard soil-cement tests were made on the base and added fine materials, and a cement factor of 10 per cent, by compacted volume, was found to give satisfactory hardness. During construction 10 per cent cement was used except in areas where concentrated plane traffic was anticipated. There the cement factor was increased to 12 per cent.

Soil-cement was processed by two traveling mixers, followed by two sheeps foot rollers fully ballasted with sand and water. As a final finish operation, water was applied in a light, fine spray to the soil-cement, followed by pneumatic rolling to tightly seal the surface and prevent penetration of the bituminous topping material. The bituminous material served as a protective cover inhibiting loss of water by evaporation from the soil-cement.

Although daily production was somewhat limited due to keeping runway facilities open as much as possible to traffic, a peak daily production of 14,305 sq. yd. was attained. Average for the project was 7,000 sq. yd. per day.

Restrictions on Power of Municipalities to Incur Debts for Improvements

A village passed an ordinance authorizing the construction of a new sewer system or the remodeling of the city's old system and made a contract with a civil engineer for the rendering of services in connection therewith. At an election held for this purpose, electors voted against making the improvement and the city abandoned it. The engineer sued the village to recover the reasonable value of services rendered by him in connection with the proposed construction. The parties agreed that the plaintiff was always ready and

willing to perform his duties under the contract and that the reasonable value thereof was the amount he claimed. The village's defense was that the contract was illegal as creating indebtedness beyond that permitted by the Illinois Constitution, 5 per cent of the municipality's taxable property. This defense was sustained. (Hancock v. Village of Hazel Crest, 318 Ill. App. 170, 47 N. E. 2d 557.)

This constitutional limitation—and many states have similar constitutional limitations—does not apply to contracts for local improvements where the cost is to be borne wholly by property benefited or to improvement bonds. There is a conflict of authority in the various jurisdictions as to whether the debt limit applies to obligations imposed by law upon states and municipalities as distinguished from those that are discretionary or voluntary. The Illinois, Pennsylvania and Wisconsin courts hold that the limitation applies even to obligations imposed by law.

Specifications for Air-Entraining Cement

At the annual meeting of the American Society for Testing Materials in June, important changes were reported in specifications covering treated portland cement for pavements (C 175) which are now changed to cover air-entraining portland cement. Requirements permit the addition of Darex, an air-entraining material studies of which are detailed in the report. Certain modifications and strength requirements have been incorporated in the standard portland cement specification (C 150).

J. C. Pearson pointed to the danger of excessive entrained air which might result in reduction in cement content to the possible detriment of other properties than resistance to freezing and thawing.

Stream Pollution in St. Joseph River Basin

The Indiana State Board of Health has studied stream pollution conditions in each of the 14 river basins into which the state is divided, and in the June issue of its "Monthly Bulletin" describes briefly those in the St. Joseph river basin, which ranks 12th in the list as regards sewage treatment.

In this basin are 31 communities with populations of above 300, from South Bend, with a population of 101,268 (1940 census), to Orland, with 307 population; the combined population being 204,146. Of these 31 towns, 20 have public water supplies but only 4 have sewage treatment, and only 2 have complete treatment. The three largest cities, with a combined population of 163,000, or 80% of the basin's total, have no treatment plants. The four plants treat the sewage of 19,900, or a little less than 10% of the basin's population.

In addition to domestic sewage, the streams in this basin receive wastes from 6 milk plants, 3 meat industries, 3 breweries, 2 metal industries, 2 pulp and paper mills and a rubber and textile mill.

"Ground water supplies are abundant in the basin and for this reason there are no public or semi-public surface water supplies. South Bend, for example, has approximately 87 wells and is the only city in the State with a population above 35,000 using ground water only for the municipal supply. The availability of the ground water is probably one reason why so little has been done to abate stream pollution. Clean streams, however, are of value in many ways other than as a source of water supply. Such intangibles as

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natural beauty and recreational opportunities of water courses are lost when riparian rights are exceeded and ugly, health menacing pollution assumes all rights and privileges."

Garbage Collection Fees at Miami

In four months Miami, Florida, has collected $150,000 in garbage fees from 50,000 residences and expects to receive a total of $400,000 in 1944 from this source. The service charge of $8 a year for two collections a week from two containers may be paid in one or two equal installments. A charge of 75 cents per year is made for each additional receptacle and establishments requiring more than semi-weekly collections pay 10 cents for each additional collection of garbage from each receptacle. Seven outlying drug stores with bonded collectors act as sub-agents for the city finance department in receiving applications for collection service and payment of the fees. A tag which varies in shape and color with the amount paid is attached to the garbage can by residents and is evidence to the garbage collector that the fee has been paid. The only enforcement thus far attempted is the discontinuance of service for non-payment.

Service Charges for Sewerage and Garbage

Sunnyside, Wash., with a population of about 2,500, has adopted an ordinance fixing rates and charges for sewerage service and refuse collection. Rates for sewerage service are $2.50 per month for residences, $1 for each dwelling unit or apartment in apartment houses, $5 for boarding houses or hotels, $2 for business houses, and $20 for school buildings. Rates for refuse collection and disposal service start at $1 a month for residences and each unit in apartment houses, $6 for hotels and restaurants, and $10 for each of nine school buildings. The money collected from these two service charges will be put into a special fund to pay off $85,000 in bonds which are to be sold to finance improvements of both services. The ordinance also provides that every building in the city must be connected with the city-owned sewerage system and must use the city's garbage collection service.

Contract Invalid But Payment Ordered for Services Received

A city was held liable to a power company for the reasonable value of the city's use over a period of years of water pumping equipment purchased from the power company where the municipality was authorized to contract with the power company to furnish water service for the benefit of the municipality, although no express contract was entered into between the parties, under what is generally known as "the common honesty rule," implying a promise to pay for the reasonable value of services received, although the contract was void as creating debt in violation of the State Constitution. The city could have entered into a valid contract with the power company, yearly, to furnish the water services which it received. (City of Eastman v. Georgia Power Co., Georgia Court of Appeals, 25 S. E. 2d 47.)

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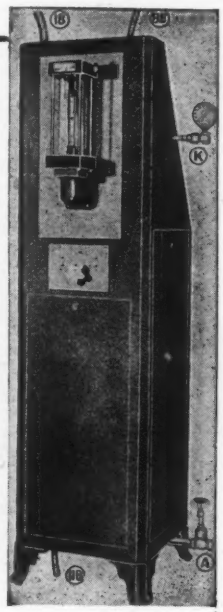

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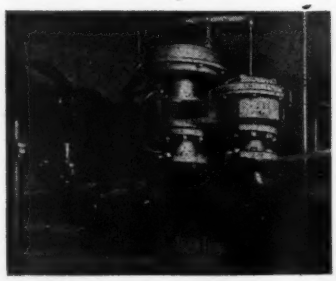

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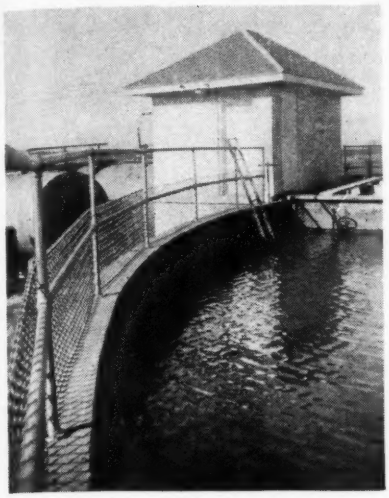


Head house and mixing chamber. Butler, Missouri.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Newport's New Water Facilities

Newport, R. I., is on an island with an area of 45 sq. mi. and until last year obtained its water supply from six storage reservoirs on the island, which impounded the flow of all important streams on the island except Lawtons Valley brook. By constructing a 40 mg reservoir on this brook, with a purification plant to supplement the existing 6 mgd plant, it would be possible to obtain the desired total safe supply of 7½ mgd. In 1942, due to a period of low rainfall and enormous expansion of naval requirements, immediate increase in the supply became necessary, while it would be impossible to complete the Lawton reservoir until after the spring rains of 1944. Therefore the capacity of an existing reservoir was increased 150 mg by raising the embankment 6 ft., catching the 1943 spring rains. Meantime a stream ending in a tidal inlet on the main land was developed by building a dam, a pumping station and a subaqueous pipe across to the island. The water in this inlet was salt, at times containing 5,000 ppm of salt. Two lines of timber bulkhead were driven between which to build the dam, and the flow of the stream which collected behind these was pumped past the dam continuously for three months at an average rate of 10 mgd., at the end of which time the salt content had dropped to 125 ppm. This water was used in 1943-44. Meantime the Lawtons Valley dam and purification plant were under construction and have recently been completed. Heavy concrete sections were used since reinforcement was difficult to obtain. The total cost of the improvements was about $4,000,000.[E13]

Waterworks Management

Good management of waterworks utilities will result only when *continuing* policies are allowed to develop and to thrive under merited public approval. Such policies produce adequate facilities, good operation, practical maintenance, logical replacement and expansion, sound fiscal methods, satisfying public service, reasonable provision for the future, and all-round efficient administration.[A89]

Waterworks Administration In Canada

Ontario's Public Utilities Act provides for placing the waterworks administration in the hands of either the council or a commission. In either case the people are the corporation, for which the administrative body acts, having power to expropriate land, waters and water privileges; divert any lake, river, pond, spring or stream within or without the municipality, or purchase any privately owned water works.[A92]

In Nova Scotia a Board of Public Utility Commissioners regulates and controls all public utilities, including water works both privately and publicly owned. (There are only two privately owned water utilities in the province). It controls rates and financing, and its decisions are final, subject only to an appeal to the Supreme Court.[A91]

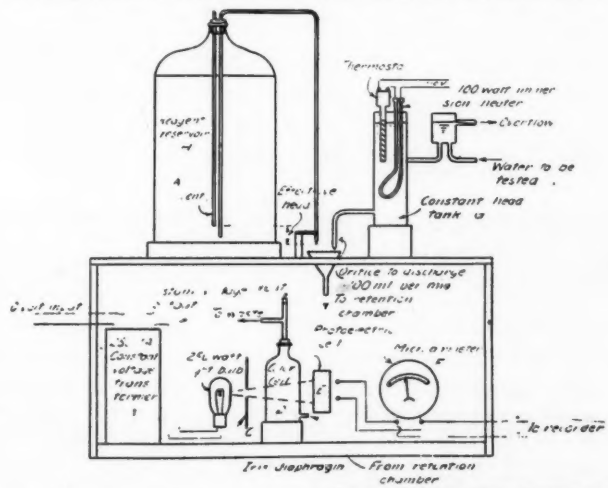
The other six provinces have legislation on public utilities and all have provincial utility commissions to supervise them and adjust rates. In British Columbia, Alberta and Quebec, municipally owned water works are not included as public utilities unless they furnish water outside the corporate limits.[A90]

Unions for "White Collar" Men

The somewhat astonishing disparity between values placed upon labor, crafts and trades on the one hand and professional or "white collar" work on the other is, to a considerable degree, the result of an apathetic attitude toward their members' economic welfare by organizations composed of professional men and "white collar" workers, or their indifference to or lack of familiarity with, the opportunities presented to them. These workers, described by Senator Thomas as the 20 million forgotten Americans, have been practically lost in the progress that labor has made. But the law does provide for them; it permits them to organize for collective bargaining; in fact, in some cases it requires that they be represented by some bargaining agency—a labor union if they have no union of their own.[A94]

Automatic Residual Chlorine Indicator

At the Springfield, Ill., waterworks an automatic photoelectric residual recorder has been used, described as more



Courtesy American Water Works Ass'n

Schematic representation of residual chlorine recorder mechanism

compact, reliable and convenient than that installed a few years ago in Montreal. It uses the orthotolidine reaction in the blue color range and has a sensitivity of approximately 0.01 ppm in a range from 0 to 1.5 ppm. It consists essentially of two separate parts—the light system and the color-development system. (See illustration.) A is a constant voltage source; B is a light bulb; C, an iris diaphragm; E, a self-generating photoelectric cell of the barrier-layer type; F, a small microammeter, and a recording potentiometer. H is a reagent reservoir; I, a mixing funnel and a retention chamber; D, a color cell. The light beam from the bulb passes through the iris diaphragm and color cell and impinges on a Weston model 594 YR type 3 photronic cell placed behind the color cell. A continuous flow of chlorinated water enters G (being kept at 20° C during the winter months) at the uniform rate of 100 ml per min.; thence into a mixing funnel, which also receives 2 ml per min. of orthotolidone solution; thence, after 5 min. for color development, to the color cell. The instrument has operated for two years with entirely satisfactory results.[A95]

Water Demand in a Small Town

Middletown, Mass., has a population of 2,348, of which about 1,000 are supplied with water from the public mains. It has 44,719 ft. of 18″ to 2″ pipe (9,506 ft. of the latter). The total consumption was measured by passing it through a disc meter on a by-pass around a closed gate. This showed a constant consumption of 7.5 gpm between 2 a.m. and 4 a.m.—presumably leakage. In 1939, 93% of the water was accounted for. The average consumption was 40 gpd per capita. During a 24-hr. test the maximum average demand in any one hour was 52 gpm. The maximum rate for any hour was 168% of the day's average, at 10 a.m. Consumption in 1944 with 100% of the services metered was 20% less than in 1939 with only 10% metered.[F51]

Waterworks Employee Publications

"If you have more than ten employees, and are not now getting out regularly some kind of publication, whether it be a bulletin, a four-page leaflet, or a more formal appearing publication, you are passing up an unusually effective means of instilling in your employees a fine spirit of loyalty toward your company or department." Many of these are sent overseas to employees in war service.[A96]

Comments on the Recent Drinking Water Standards

Many waterworks men have objected to certain parts of the "Public Health Drinking Water Standards" adopted by the U.S.P.H.S. in 1942; especially to the "Manual of Recommended Water Sanitation Practice" which accompanied these. These objections have been summarized as follows:

A. The interest of the U.S.P.H.S. in standards for water on interstate carriers derives from its interstate quarantine authority. Acting under this authority, the officers of the Service are entitled to stipulate that water placed in cars, etc., used in interstate travel shall conform to definite quality characteristics. If the water which a carrier proposes to place in a drinking water receptacle does not conform to these requirements, the Service may forbid its use. The presumption is that thereupon the carrier must find elsewhere water of a quality that will be satisfactory to the Service.

B. The U.S.P.H.S. officers, both in the 1925 and 1942 Standards have evidenced a tendency to extend this limited interstate quarantine authority by the implications of manuals, codes, etc., to cover general stipulations concerning the quality of water sold for public uses in the various communities; the structural characteristics of the water works system; and the methods of operating water works systems. In the 1942 Standards, this tendency further extends to certain controls of the water piping in the private property of individual customers of the water utility.

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The A.W.W.A. expressed opinion is that while the characteristics of water supply systems and the condition of the plumbing on consumers' premises in a city may have a bearing upon public health, the control of these conditions lies within the states and cities and cannot properly be considered as deriving from the authority under which the Service functions—its interstate quarantine authority. Water works executives historically are known to be responsive to their public health responsibilities and willing to construct and operate water systems in such fashion as to promote the public health. But water works executives observe that the control of customers' plumbing is rarely, if ever, vested in their hands. They, therefore, feel that objection can logically be made to an interstate water quality standard which can be used as the basis of non-certification of an otherwise satisfactory public water supply, because the plumbing on customers' premises does not conform to codes that they do not administer and for which the city executives do not hold them responsible.

C. The willingness of water works men to discuss municipal water quality characteristics with the Service and their co-operation with public health measures in general has led them, and perhaps the Service likewise, to overlook the authority under which the Service promulgates and administers the Drinking Water Standards and the legal limits beyond which that authority does not go.[A97]

Keeping Filters Clean with Chlorine

Ottumwa, Ia., takes water from the Des Moines river, treats it with chlorine, lime, soda ash, iron sulphate and carbon dioxide and filters it. The water reaching the filters has a turbidity of 2 to 10 ppm, mostly precipitate of calcium carbonate. Since 1933 the sand has never been removed and there have been no mud balls, filter cracks or lime incrustation. This is attributed to the fact that a strong solution of chlorine is applied regularly when the filters are washed and allowed to remain in the filter for 12 hours. The residual on top of the filters is about 19 ppm at the end of the washing period and 13 ppm after standing 12 hours. There is no evidence that the chlorine solution has caused any deterioration of pump, pipe line or filter underdrains.[G25]

Fluorides in Water Supplies

Some problems involved in carrying out the plan of adding fluorides to water supplies to reduce dental caries are: The major effect will not show itself for 8 or 10 years or more. A large part of the population does not use public water supplies. It may interfere with certain industrial processes. Chemical reactions might occur between fluorides and the pipes or constitutents of the water. The margin of safety between effective doses and those producing undesirable effects is too narrow.[B15]

Sterilizing Mains On War Projects

During the construction of cantonment and other war projects, trench water often stood for weeks in water pipe, causing bacteria to breed in the jute packing. Rubber gaskets were more desirable than jute or hemp from a sanitary standpoint; if they could not be obtained, asbestos rope was used with satisfactory results. If jute is used it should be placed in a strong chlorine solution before using. Suggested procedures include: Be sure all pipes and materials going into construction be as clean as possible. Keep trench water out of pipes; caulk metal stoppers at all pipe openings at the end of each day's laying, using temporary packing. Insert enough chlorine in each pipe to form a chlorine solution of 50 ppm. Fill the pipes slowly and allow the chlorinated water to stand in them 24 to 48 hrs.; then flush all mains, hydrants and services for at least 2 hrs. When tests show no chlorine, test for contamination at fire hydrants and faucets on each service. If these tests are not satisfactory, sterilize with liquid chlorine to 50 ppm and allow to stand 24 to 72 hrs.[E14]

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Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n,* note or short article; *p,* paper before a society (complete or abstract); *t,* technical article.

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87. The London Water Supply. By Henry Berry. Pp. 703-725.
88. The Promotion of Water and Sewage Works Development. By E. L. Filby. Pp. 725-733.
89. Good Water Works Management. By Wendell R. LaDue. Pp. 734-739.
90. Utility Administration in Canada. By A. E. Berry. Pp. 740-742.
91. Utility Problems in Nova Scotia. By Ira P. Macnab. Pp. 743-752.
92. Utility Administration in Ontario. By O. H. Scott. Pp. 753-754.
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94. Employee Organization in the Professional Field and the Public Services. By A. M. Rawn. Pp. 762-770.
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17. Interim Report of American Research Committee on Grounding. Pp. 168-202.

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5. Postwar Planning in Maine. By F. A. Milliken. Pp. 70-75.
6. Water Works Law. By David E. Moulton. Pp.1-VIII.

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3. Pumping Equipment. Pp. 1-7, 10.

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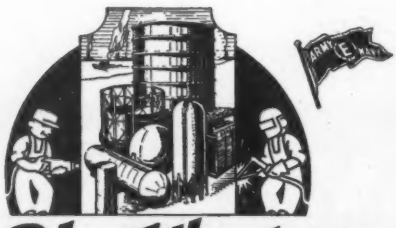

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Entrance to sludge control rooms, Cranston, R. I.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Sewage Treatment In Canada

There are about 1,300 public water systems in Canada but only about 500 sewer systems, and only 115 municipal treatment plants, of which only 63 include secondary or complete treatment. Plain sedimentation and Imhoff tanks were used at first, but none of the latter has been built for the past 20 years. Trickling filters were used in early plants but later were not considered for even small plants, activated sludge being adopted instead in 48 municipal plants, partly because power costs only about 0.5 cent per k.w.h. and because the Ontario Dept. of Health recommended it enthusiastically. Capital costs of activated sludge plants average $14.09 per capita or $143,100 per m.g. design capacity; operating costs average 87 cents per capita or $35.00 per mgd.

Canadian weather makes glass covering of drying beds desirable. Sludge treatment by mechanical dewatering and vacuum filters has been the recognized procedure for both large and small plants in recent years. Chlorination of sewage is not practiced to a great extent.[C65*]

Sludge Concentration And Barging

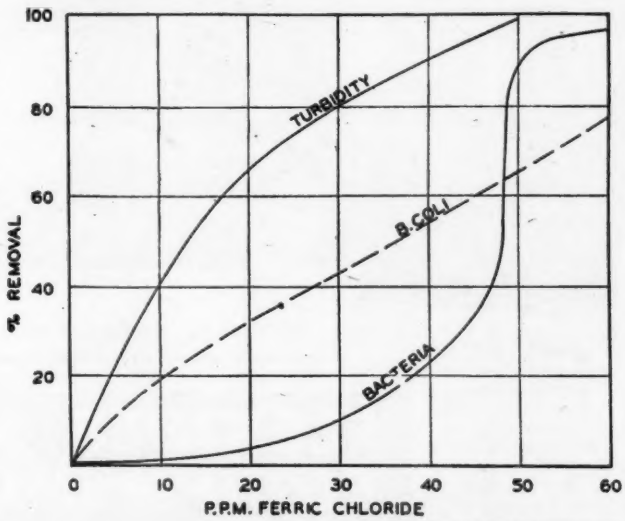
At the Joint Meeting treatment plant at Elizabeth, N. J., the sludge is barged to sea, and is previously concentrated to reduce the cost of barging. The solids settling in the settling basins are pumped to storage tanks, where they compact by settling and the supernatant water is decanted off; the volume of sludge being reduced 37% to 49%. If the sludge is too concentrated it flows slowly through the pipes to the barges. It is found that with greater concentration of solids than about 9% the sludge does not flow readily in cold weather. There is a degree of concentration at which the greatest economy results, balancing increased time of loading against decreased volume of sludge to be barged. Temperature plays a prominent part in the time required to fill a barge. The average time for barging 1,000 tons of sludge in 1942 was 92 min., but 116 min. was required when the temperature was 51-54° and only 69 min. when it was 68-73°. There is direct, uniform relation between temperature and filling time. The cost of barging in 1942 was $4.34 per ton of dry solids.[C66*]

Disposal of Laundry Wastes

Domestic laundry waste normally is only 5 to 10% of the average daily sewage flow, but may greatly exceed this concentration for short periods of time and seriously affect chemical and biological processes, especially in small plants; in those treating more than 5 mgd there is relatively little effect. To choose the most economical and workable method of handling the waste and to determine the treatmnt at sewage plants, information must be collected pertaining to (1) sewage flow (hourly totals and rates for wet and dry weather); (2) capacity of sewage plant in relation to flow, and B.O.D. loadings and removals obtained by existing units; (3) laundry waste flows (quantity, rates, hourly and daily fluctuations); (4) B.O.D. of laundry waste (waste alone, combined, and fractions of wastes; (5) chemicals locally available for treatment (lime, picking liquor, acid, magnesium salts, sea water, zeolite softener regenerant, high mineral content, water, etc.); (6) equipment and personnel available at laundry and sewage plant. From these data the plant loadings in respect to flow and B.O.D. can be calculated for any one or more of the following procedures: Equalization of flow of all or part of the laundry waste. Holding the waste and discharging it during periods of low loading at the sewage plant. Chemical treatment at the laundry of all the waste or of the strong fractions of same. Treating combined sewage and waste by adding chemicals or by pre-treatment or flocculation with waste activated sludge prior to the primary settling tanks.[C64*]

Bacterial Reduction By Chemical Treatment

Investigation concerning the reduction in bacteria in sewage by coagulation alone was conducted, using ferric chloride, 25 ppm, as the coagulant, with pH adjusting chemicals. Averages plotted (see illustration) showed that when 80% of the sewage turbidity was removed there were corresponding reductions of 11% of total bacteria



Courtesy Sewage Works Engineering

Bacterial removals by chemical treatment with ferric chloride

*See Bibliography in the July issue.

and 44% of B. Coli; and at 90% turbidity removal the bacteria removals were 23% and 54% respectively. In tests with pH varying from 2.5 to 10.5, high reductions of both total bacteria and B. Coli occurred when the pH was below 4.0 or above 8.5, probably because of the bactericidal effect of mineral acidity and alkalinity. Removals of each exceeded 99% at a pH of 2.5 or 9.0. When sufficient lime was added to form normal carbonates and caustic alkalinity, bacterial removal was high; raising the pH to 9.5 can be expected to remove in excess of 80% of total bacteria and 90% of B. Coli. But no coagulating chemicals now in use give complete removal.[H33]

Relative Stability And B.O.D. Tests of Effluents

Each of these tests has been used for years. They are quite different in nature and bear no direct relationship. A treatment plant should produce an effluent which the receiving stream can absorb and still meet the requirement set as to dissolved oxygen—3 ppm for the preservation of fish life. If any dissolved oxygen is present in the stream, little will be derived from any nitrates present, these serving only as a last resource; if an appreciable amount of oxygen is so derived, conditions are too close to putrescibility to be acceptable. It is not sound engineering practice to depend on an effluent with a B.O.D. of such value that conditions in the river are so close to becoming septic that the nitrates must furnish oxygen. If the dissolved oxygen in the stream must be maintained at or above 3 ppm the presence of nitrates is unimportant. "As far as oxidation of organic matter in the stream is concerned, it makes no difference whether a plant effluent is low or high in nitrates, except when the stream is on the ragged edge of turning septic. . . . Regardless of the type of plant, all effluents should represent such a degree of treatment that the quantity of reductants or organic matter discharged into the stream will be low enough to permit an oxidizing environment to exist at all times according to the criterion established for stream condition. . . . The concentration of reductants is indicated by the B.O.D. test which serves as the index of effluent quality. The concentration of oxidants in the stream is indicated by the B.O.D. test which serves as the index of effluent quality. The concentration of oxidants in the stream is indicated by the dissolved oxygen test and serves as an index of the oxidizing capacity of the stream. The relation between reductants and oxidants as they exist in the stream is an index of the state of oxidation and is measured by the oxidation-reduction potential."[G20]

Oxidation-Reduction Potential Measurements

The actual mechanism of the activated sludge process appears to involve physical, chemical and biological factors, and be so complex that no simple explanation is possible, but the measurement of redox potential changes may help in the interpretation of conditions and a clearer understanding of the process and a better method of plant control.

The bacteria for effecting oxidation and reduction are present naturally in activated sludges and sewage, and the changes which occur can be noted by the measurement of the electrode potential changes. The electrode potential of a sewage-activated sludge mixture undergoing aeration increases as the sewage is being oxidized and the rapidity of this increase is dependent upon the concentration of oxidizable material present. With mixtures containing the same amount of activated sludge and varying proportions of sewage, the mix having the largest amount of sewage and hence the highest concentration of oxidizable organic material will have a lower initial potential and the rise in the oxidation-reduction potential will be slower.

Correlation between the stage of oxidation of sewage, as measured by the rate of oxygen utilization, and the

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oxidation-reduction potential is demonstrated in both plant and laboratory studies.

As the organic matter in the sewage is being oxidized the redox potential increases, indicating that the ratio of oxidant to reductant increases. When the base rate of oxygen utilization is reached the highest oxidizing intensity of the mixture is attained.[C62*]

Relative Stability Test for Sewage

The possibility of using dyes other than methylene blue, to obtain an indication of relative stability in less time than that required by the standard methylene blue procedure, was investigated, the dyes tested being resazurin, neutral red, gallocyanine, thionin, sodium indigodesulfonate, phenosafranin, safranine T indigotine, and brilliant cresyl blue, covering a wide range of oxidation reduction potential, with electrical potentials both above and below that of methylene blue.

Testing with sewage influents and effluents it was found that brilliant cresyl blue and thionin decolorized more quickly than methylene blue at 20°C.—in half the time for relative stabilities between 5% and 25%. The end point with thionin is difficult to distinguish and its use is not recommended.

The addition of thioglycollate to the sewage samples markedly decreased the time for decolorization with all of the dyes used. Thus methylene blue at 20°C. decolorized in half the time when 2.7% thioglycollate was added, and in one-fifth the time at 37°. A dependable estimate of the relative stability of a sewage sample may be obtained in approximately one-fifth the time required by the standard methylene blue procedure by using brilliant cresyl blue along with 2.7% sodium thioglycollate stock solution. This time multiplied by 5 may be substituted in Phelps' formula.[C63*]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

D
The Surveyor
May 26
17. *p.* Development of Main Drainage in Ayrshire. By John Allan. Pp. 251-252.
18. *p.* Means of Increasing the Work Done by Percolating Beds. Discussion of D 14. Pp. 265-267.
June 9
19. Sewerage in Relation to the National Water Policy. By R. G. Murdoch. Pp. 273-274.

E
Engineering News-Record
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12. Street and Sewer Maintenance Hints. Pp. 86-87.

G
Water Works & Sewerage
June
19. Use of Nomographic Charts for Flow in Pipes, Full and Partly Full. By H. M. Gifft. Pp. 203-206.
20. Oxidants and Reductants in Sewage Plant Effluents and Streams. By Rolf Eliassen. Pp. 219-221.
21. Application of the Sludge Index Test to Plant Operation. By Don E. Bloodgood. Pp. 222-224.
22. *p.* Sewer Design Practices. By W. L. Malcolm. Pp. 227-230.
July
23. *p.* Selling Postwar Planning to the Local Taxpayers and Governing Body. By Frank D. Livermore. Pp. 251-252.
24. Viscose Rayon Manufacturing Wastes and Their Treatment. By E. T. Roetman. Pp. 265-268.

H
Sewage Works Engineering
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31. Sanitation of 100,000 Miles of Streams in Pennsylvania. By H. E. Moses. Pp. 334-335, 358.
32. Stream Pollution Survey of the Black Warrior River. By Gilbert H. Dunstan. Pp. 336-337, 359.
33. Bacterial Reduction by Chemical Treatment. By Harry W. Gehm. Pp. 338-339.
34. War Experience With Grease Interceptors. By A. H. Dreher. Pp. 340, 359.

J
American City
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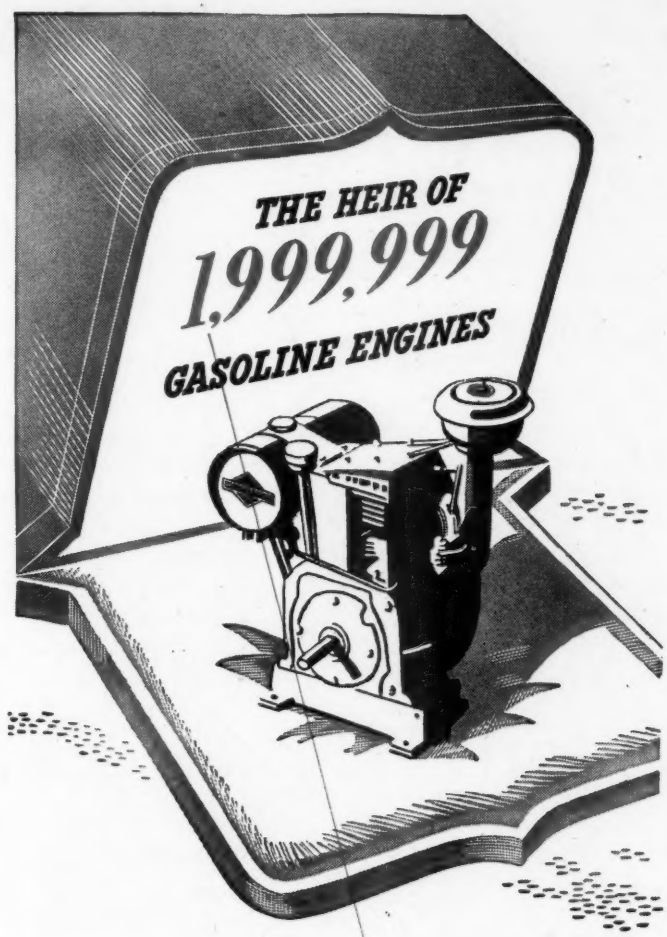
41. A Sewage Plant Park. By James R. Losee. Pp. 61-62.
42. How to Design a Grit Chamber. By H. M. Gifft. Pp. 66-67.

P
Public Works
July
31. *p.* Collection and Disposal of Grease. By Herman M. Ross. Pp. 17-19.
32. Supreme Court Decision Relating to Industrial Waste Treatment in a Municipal Plant. By Glen J. Hopkins. Pp. 23-24.
33. Cast Iron Sewer Siphon Under Tunnel. P. 36.
34. Things Found in a Plugged Sewer, and How. P. 42.
35. *n.* Written Orders for Extra Work on Sewer. Pp. 42-43.



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Keeping Up With New Equipment

Sewer Scooter

J. C. Fitzgerald
P. O. Box 289, Coral Gables, Fla.

The Sewer Scooter consists of a shield, or piston, to fit each size of pipe, attached to a wheeled carriage and operated by a line attached to the Scooter from the street. It is lowered into the line, and the shield with its rubber rim seals the flow of sewage, and as the head builds up, the head pressure causes the Scooter to move into the line, until it piles up enough debris to slow up the Sewer Scooter. Often only 6" head is quite sufficient for operation of the Sewer Scooter.

Then the shield is opened by the attached line, allowing the sewage to flush past the shield and move the debris along the line. As the head drops the shield is allowed to close and the Sewer Scooter advances into the line again. This is repeated all through the line.

When obstructions are encountered too heavy to be moved by flushing, the shield will push them by using the momentum of the moving sewage in the line. This is done by flushing, then as the speed on the sewage reaches its highest point, the line is released allowing the shield to exert this force on the obstructions.

The larger sizes will develop more power and still have only a small pressure per square inch on the wall of the line. The only part carrying this pressure is the rubber rim of the shield.

Write for an illustrated folder giving complete information on this new sewer cleaner.

Plasul Basolit for Joining Clay, Concrete and Cast Iron Pipe

Nukem Products Corporation
Buffalo, N. Y.

The manufacturer's description is in part as follows: "It is a rubberized sulphur carbon compound used without the addition of any other ingredients. It is shipped granulated in 100 lb. strong burlap bags and can be stored anywhere and indefinitely without deterioration in substance or quality. It is immune against all commercial acids except chromic acid and is not affected by atmospheric conditions. It can be remelted and used over again. When in the molten state, Plasul Basolit flows freely, sets within a few minutes, adheres solidly to the surface of stone, concrete, iron and to itself, eliminating caulking." It is claimed to provide a water, acid, and root-proof joint for vitrified clay, concrete, and cast iron bell and spigot pipe. The manufacturer issues a folder giving more complete description and instructions as to the application, and a copy will be sent upon request.

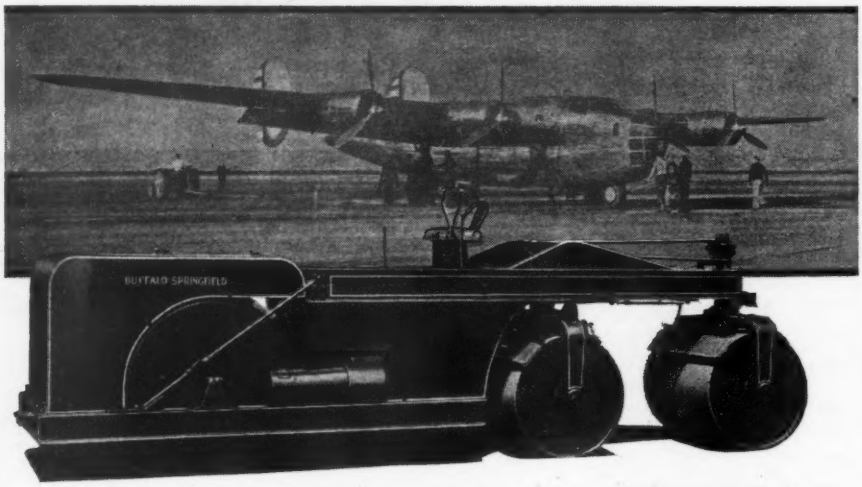
Wedge-Slot Screens for Sewage and Water Filtration

Hendrick Mfg. Co.
Carbondale, Pa.

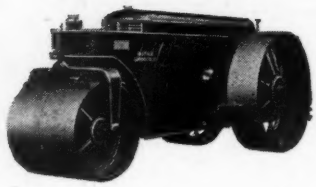
For wet screening and dewatering the manufacturer says Wedge-Slot screens are designed for maximum capillary action. This is most pronounced with Profile "B," but even the abrasion resisting Profile "C" has a taper from the head flanges to the lower bar sides, so that moisture on the bar sides will draw moisture from the surface. Moisture does not follow down the bottom of the Wedge-Slot screen. The flow is broken by the U-Support sides.

Three advantages of Wedge-Slot U-Supports: They furnish required screen support by variations in U-Support Spacing and height; they furnish and maintain slot spacing, by anchoring each profile bar in separate slots in the U-Supports; they furnish and maintain screen rigidity, by holding the rivets, which pass through each profile bar, and are tightly held inside the curved top of the U-Support.

Write for blueprints on special assemblies.



VICTORY *in* 1944?



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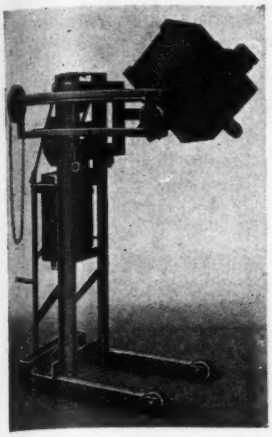

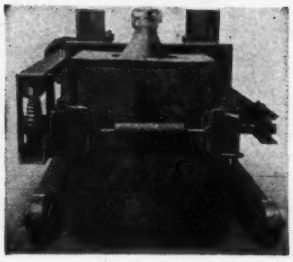

"Revolvator" Carboy Dispenser.

Safe and Convenient Carboy Dispenser

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North Bergen, N. J.

Pouring acids from a carboy by hand is an arduous and hazardous procedure. Furthermore, it is often impossible to raise the container high enough to empty into a vat or tank.

The Revolvator (Reg. U. S. Pat. Off.) special Carboy Dispenser here illustrated changes all this and makes the job easy and entirely safe.

Picture 1 shows how the Revolvator is wheeled into position straddling the carboy on the ground. Turning the roller in front of carboy tightens the clamps through heavy screws until the carboy is securely held. Turning the crank seen in picture 2 quickly elevates the carboy to the desired height. It is then tilted slowly by rotating the chain at left driving through worm mechanism. The carboy is held in any desired position until moved again by the chain. After emptying, the carboy is returned to an upright position and gently lowered by the standard Revolvator dead man brake lever which is the same handle as is used for elevating.

The Revolvator Carboy Dispenser is a single example of special adaptations of Revolvator portable elevators, the pioneer in portable elevator development. A similar machine is used for barrel or drum dumping.

Sand and Gravel Washing Equipment

Eagle Iron Works
Des Moines, Iowa

How the Eagle washers, both single and double screw type, are built, how they operate, their various special features and detailed discussion of their operating mechanism are given prominence in the booklet. Numerous lists of specifications and engineering drawings are included.

Eagle single and double screw fine material washers are next pictured and detailed Eagle shale remover installations and the Eagle auxiliary shale remover are described; and a prominnt member of the Eagle line, the log washer, is completely discussed. The log washer is a device for breaking down cemented aggregate, tough clay, conglomerates and some types of soft stone. Illustrations of installations are shown, as well as mechanical drawings and technical descriptions.

For producers of sand and gravel, the catalog will prove a valuable source of information. It will be mailed without obligation on request.

Propeloflo for Main Line Metering

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In a new four-page two-color folder the manufacturers describe and illustrate this comparatively new meter for

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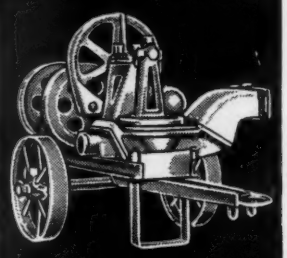

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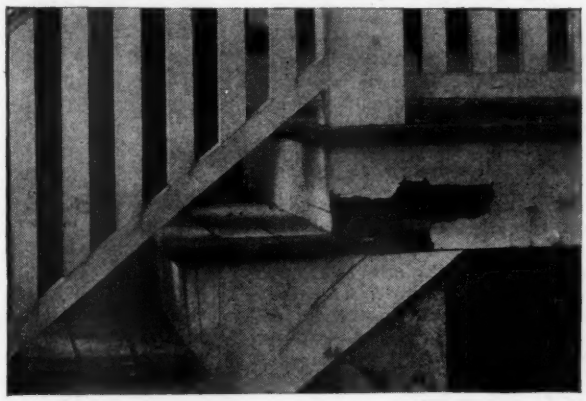
Rot Ruins Reputations



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main line metering, explain what it will do, and how easily it can be installed.

A table is included giving the normal range—gpm, sizes in inches, and approximate shipping weight.

Copies of this bulletin are available upon request to the manufacturers.

"Results of Publicly-Owned Electric Systems"

Under this title the consulting engineering firm of Burns & McDonnell, Kansas City, Missouri, have just published their new eighth edition, 1944, of an electric rate book showing the operating records, earnings, output, rates, net revenue, valuation, and other information as to the use and cost of electricity in 767 publicly-owned systems.

The new volume of 450 pages has interesting graphs and tables showing the rates and revenue. This edition also covers new information showing a comparison of the rates of both private and municipal plants in every city of over 5,000 population. Over half the publicly-owned systems in the country have lowered their rates since the 1941 edition. A majority of the 767 systems report "no bonded indebtedness." The type of plant, whether steam, diesel or hydro, and its form of management are recorded.

Every complete record received from publicly-owned systems has been recorded. Therefore, the 767 systems represented are considered a fair, unbiased cross-section of what publicly-owned systems are doing in producing and selling electricity.

City officials, operators, and managers of both private and municipal systems will find these operating records of much interest and value. It is the only book of its kind published, giving rate schedules and reliable statistics of public operation. As a reference it is indispensable to every city official or user of electricity who wants to keep abreast of the rapidly changing electric rates.

The book may be obtained at the cost of $10.00, prepaid, from the authors and publishers, Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City 2, Missouri.

Cement Handling Equipment

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Champaign, Ill.

Describes complete bulk cement plants and cement handling equipment, gives details and useful information on this specially engineered equipment.

Offering quick, convenient handling with a minimum of manpower and time, these Johnson Cement Chargers, Dutchmill Plants, Bins and Silos are sized to fit any on-the-job requirements. Much of this equipment can be purchased in small units, then enlarged economically, and without waste, as needs expand. Fully detailed in this bulletin, these plants have unique features which make them outstandingly useful to concrete men.

Copies of this informative bulletin may be had upon request by writing to the manufacturers.

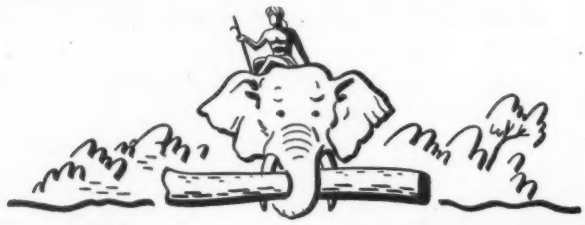
Ferrosand Filter

Hungerford & Terry, Inc., Clayton, N. J., have issued a new bulletin describing and illustrating the Ferrosand Filter which they state will completely remove all iron and manganese salts from ground and well water supplies. It is built in capacity ranges from 5 to 5000 gpm. Write for bulletin FF.

The Oxy-Acetylene Handbook

The Linde Air Products Company
30 E. 42nd St., New York 17, N. Y.

This volume fulfills an urgent need, long felt by both student and experienced welding operators, for a complete, comprehensive, and authoritative textbook on basic oxy-acetylene welding and cutting procedures. This new, durably bound, 600-page manual is invaluable as a guide for self-instruction and also as a standard classroom textbook in vocational and trade schools, technical high schools, and engineering colleges. It covers the entire range of the oxy-acetylene process, giving clear, easy-to-follow instructions for handling all the



INDIAN
TRAIL TO TOKYO

Rugged OSGOODS and Native Labor Help Army Engineers Blaze Vital Chinese Supply Line Through Burma.

U. S. Army supply lines are inching their way across the dense jungles of northern Burma along a route known as the Ledo Road. The ultimate terminus for which our engineers are fighting and sweating, digging and building is . . . Tokyo.

Helping to clear the way and move the dirt along this virgin trail are husky, mobile OSGOOD Shovels. It's a tough job; as tough a test as you'll find for ingenious men and machines. That OSGOOD'S measure up—here as well as in battle areas all over the map—is a good thing to remember.

For some day your money, now invested in War Bonds will be buying new equipment, and when that day comes OSGOOD power, maneuverability and durability will be ready to deliver the proven performance you want for your jobs!

Army Signal Corps and OWI Photos

Ledo Road to China—through tangled jungle, over innumerable rivers, streams and chasms, and blasted out of tree-covered hillsides —will in due time carry Allied supplies for the storming of Tokyo.

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When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

common commercial metals, together with simple explanations of the fundamental principles of the various methods of depositing and controlling molten metal. Considerable space is devoted to an explanation of the operating principles of oxy-acetylene equipment and instructions for its care and maintenance.

The Oxy-Acetylene Handbook, price $1.50, may be purchased at technical book stores, or at any sales office of The Linde Air Products Company. (Offices in all important industrial centers.)

Sanitary Corps Seeks Sanitary Engineers

The War Department has granted the Sanitary Corps authority to commission an additional 211 sanitary engineers in the grades of 2d Lt., 1st Lt., and Captain. Qualifications are a degree from a recognized college or university in civil, sanitary, or chemical engineering and: 2 years experience in sanitary engineering for 2d Lt.; 4 years experience for 1st Lt.; and 8 years experience for Captain (for applicants between 38 and 42 years of age).

Further information can be obtained by writing to the Officer Procurement Service Office, located in each Service Command Headquarters or to the Officer Procurement Service, War Department, Munitions Building, Washington 25, D. C.

"A Look Up the Road" —A New Caterpillar Booklet

Looking ahead to the period following the war, when municipal users of road building and maintenance equipment will again be reconditioning old and constructing new highways, a new booklet issued by Caterpillar Tractor Co. anticipates the tasks which will face city, county and state road officials and equipment operators.

The booklet, 16 pages in two colors, may be obtained by writing "Caterpillar" at Peoria, Illinois and asking for "A Look Up the Road," Form No. 8587.

Harold M. Lewis Elected President American Institute of Planners

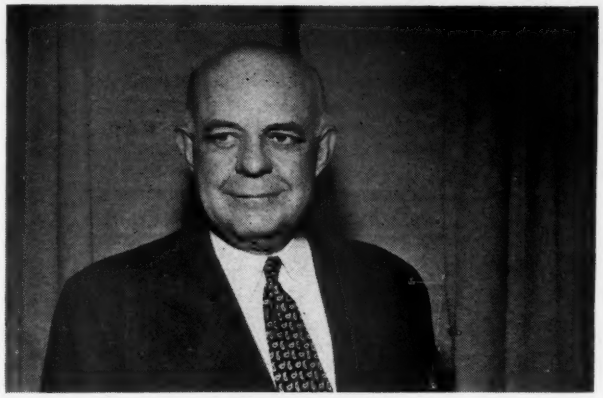
At the annual meeting of the Institute recently held in Chicago, Mr. Lewis, Consulting Engineer, Office of Edgar J. Nathan, Jr., President of the Borough of Manhattan, N. Y., was elected president. The institute is the professional organization representing those engaged in city, State and regional planning. Its meeting was held at the Hotel Stevens in conjunction with meetings of the American Society of Planning Officials.

A civil engineering graduate of Rensselaer Polytechnic Institute in 1912, Mr. Lewis has long been active in the city planning field. For twenty-one years, up to 1942, when he joined the Borough President's staff, he was Chief Engineer in charge of the technical activities of the Regional Plan Association and its predecessor.

A. J. Kavanaugh Made District Engineer for the Asphalt Institute

Bernard E. Gray, General Manager of the Institute, announces that the Southwestern Division has appointed A. J. Kavanaugh as District Engineer for the territory comprising Oklahoma and New Mexico with an office in the Petroleum Building, Oklahoma City, Okla.

For the past five years Mr. Kavanaugh has been Secretary-Manager of the Oklahoma Good Roads Association and



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for fifteen years prior to that he was engaged in engineering and construction work in Oklahoma.

Major Frank Woodbury Jones Returns to Havens & Emerson

For the past fifteen months Major Jones has been serving as a Reserve Officer of the United States Public Health Service under a particular assignment. That work having been completed on July 1st, Major Jones resumes his position as an active partner in the firm of Havens & Emerson, Leader Building, Cleveland, Ohio, and Woolworth Building, New York, N. Y.

Adolph Mueller

Adolph Mueller, chairman of the board of Mueller Manufacturing Company, Decatur, Ill., died at his Miami Beach home on May 13th. He was seventy-eight years old.

The company was founded by his grandfather, and his son, William, will carry on as president. The company has branch plants in Los Angeles, Chattanooga, and Sarnia, Ontario.

Francis S. Friel Elected President Philadelphia Section of A.S.C.E.

Mr. Friel directs the engineering staff of Albright & Friel, Inc., Consulting Engineers, Philadelphia, Pa., specializing in sanitary engineering, covering water supply and purification, sewerage and sewage treatment, waste disposal, incineration, etc. Since the start of the war this firm has designed and supervised the construction of 12 projects for the Army and Navy, costing $50,000,000.

New Athey Vice-President

B. F. Lease, Sales Manager of Athey Truss Wheel Co., Chicago, has been elected Vice-President in charge of Sales, Advertising and Service at a recent meeting of the Directors.

In making the announcement C. Kier Davis, Athey President, outlined Mr. Lease's long record with the company and his active part in post-war planning for sales of Athey products.

"Ben" Lease started with Athey in 1931 as Special Representative, with rapid advancements to District Representative; Manager, Service and Research; Manager Domestic Sales.

New Representative for Yeomans Bros. Co. in Denver

Representation for Yeomans pumping and sewage treatment equipment in the Rocky Mountain area was completed recently by the association of Thompson Pipe and Steel Company of Denver with the Yeomans engineering and sales organization. The Denver company will represent Yeomans in the sale of all products in Colorado and in the sale of sewage pumps and sewage treatment equipment in the states of Wyoming and New Mexico.

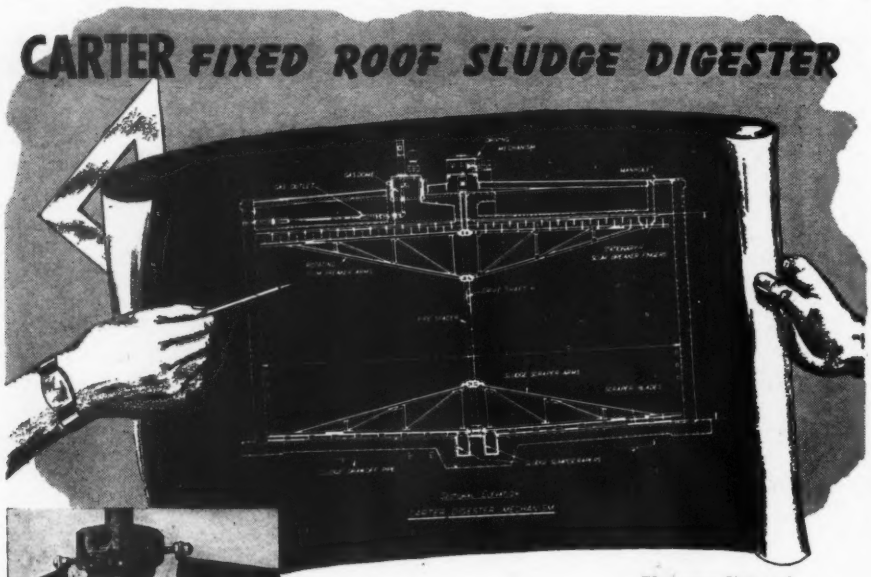
New Distributors for Osgood and General Excavator, Marion, Ohio

According to a joint announcement by Sales Managers George S. Day, of Osgood and Don B. Smith, of General Excavator Company, the following new distributors have been appointed: Acme Equipment Company, Detroit, Mich., will serve the Detroit area and 8 southern Michigan counties; Arthur C. Leake, Middletown, Va., for western Virginia and 2 counties in West Virginia; Municipal Sales Company, Richmond, Va., for eastern Virginia and the Virginia Department of Highways; Walling Tractor and Equipment Corporation, Portland, Ore., six counties in southern Washington and the entire state of Oregon; H. L. Baxter, Toronto, Ont., for the Toronto area and additional territory in southern Ontario; Rousseau Equipment Co., Winnipeg, Manitoba, for the province of Manitoba; and Dominion Distributors, Ltd., St. John's, Newfoundland for Newfoundland.

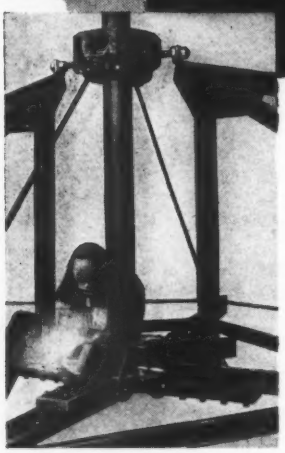
Willamette Hyster Co. Changes Name

Because the old name has outgrown its original importance with both manu-

CARTER FIXED ROOF SLUDGE DIGESTER



Elevation View of Carter Fixed Roof Digester



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2. **Continuous Break-Up of all Surface Scum Accumulations** by Rotating Breaker Arms intermeshing with fixed arms attached to roof.

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4. **Efficient Gas Collection** in electrically arc-welded, hot dipped galvanized, steel dome.

5. **Drive Mechanism composed of Triple Type Reducer** and Totally Enclosed Weatherproof Gear Motor, guaranteed to take shock loads equal to any emergency.

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2. **Remove grit and similar material regularly.**
3. **Prevent sludge accumulations in remote parts of tank.**

FORTY-ONE YEARS OF CARTER EXPERIENCE, including pioneering of many sewage treatment units now in universal use, is reflected in the sound design and all-'round mechanical excellence of this Digester, promising long, trouble-free service and economical operation. Further details are given in our Bulletin PW 4311 which will be mailed upon request.

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New York Office 53 Park Place, NEW YORK 7

When you need special information—consult the classified READER'S SERVICE DEPT., pages 67-69

facturing and sales locations now national in scope, and because the new name better describes its products, the firm name of Willamette HYSTER Company has been changed to HYSTER Company.

With plants in Portland, Oregon and Peoria, Illinois and with branch offices throughout the United States and South America the HYSTER Company manufactures tractor winches, hoists, and cranes. With capacities ranging from one to 15 tons, pneumatic tires are used on all models.

Changes in Regional Officers of Federal Works Agency at Richmond, Va.

William F. Barrett, chief construction engineer, has been promoted to the position of assistant to Regional Director C. L. Vickers.

Mr. Barrett has been acting as assistant during the past month, pending confirmation of his appointment by the Federal Works Administrator, Major General Philip B. Fleming. He takes over the position formerly held by Mr. Vickers, who was appointed regional director last month when Kenneth Markwell resigned to accept an appointment as assistant commissioner of the Bureau of Reclamation in Washington.

Lewis P. Gattis, construction engineer in the FWA regional office, is acting as chief construction engineer, taking over Mr. Barrett's former duties.

INTERESTING TRADE NEWS

American Hoist & Derrick Company, St. Paul, Minnesota, has acquired American-Terry Derrick Company, South Kearny, New Jersey, which will be operated as plant number two.

W. Wayne Wallace, formerly office and field engineer in the Chicago office of the Portland Cement Association, is now district engineer in charge of the Chicago district office, with headquarters at 33 West Grand Avenue.

M. C. Horine has resigned from the War Production Board where he was research consultant to the director of the Automotive Division of the WPB and has returned to Mack Trucks, Inc., Empire State Bldg., New York, N. Y. He will resume his position as Sales Promotion Manager. Mr. Horine joined the Mack organization as an engineer in 1918 after serving as Second Lieutenant during the first World War.

S. J. Perlow is now Eastern Manager for Davey Compressor Company, with headquarters at 330 West 42nd St., New York. Mr. Perlow has devoted many years to air compressor and air tool engineering, installation and sales.

Ohio Corrugated Culvert Company, of Middletown, Ohio, and the Shelt Company, of Elmira, N. Y., have been purchased by The American Rolling Mill Company, of Middletown, Ohio. Both companies will be operated by a wholly-owned Armco subsidiary, Armco Drainage and Metal Products, Inc., which is the largest manufacturer of drainage products in the country.

The George B. Whitehead Company, 2 Mechanic Street, Buffalo, N. Y., has been appointed a dealer for Buckeye Traction Ditcher Company, Findlay, Ohio. They will handle the complete Buckeye line of ditchers, shovels, spreaders and finegraders in more than twenty upstate counties.

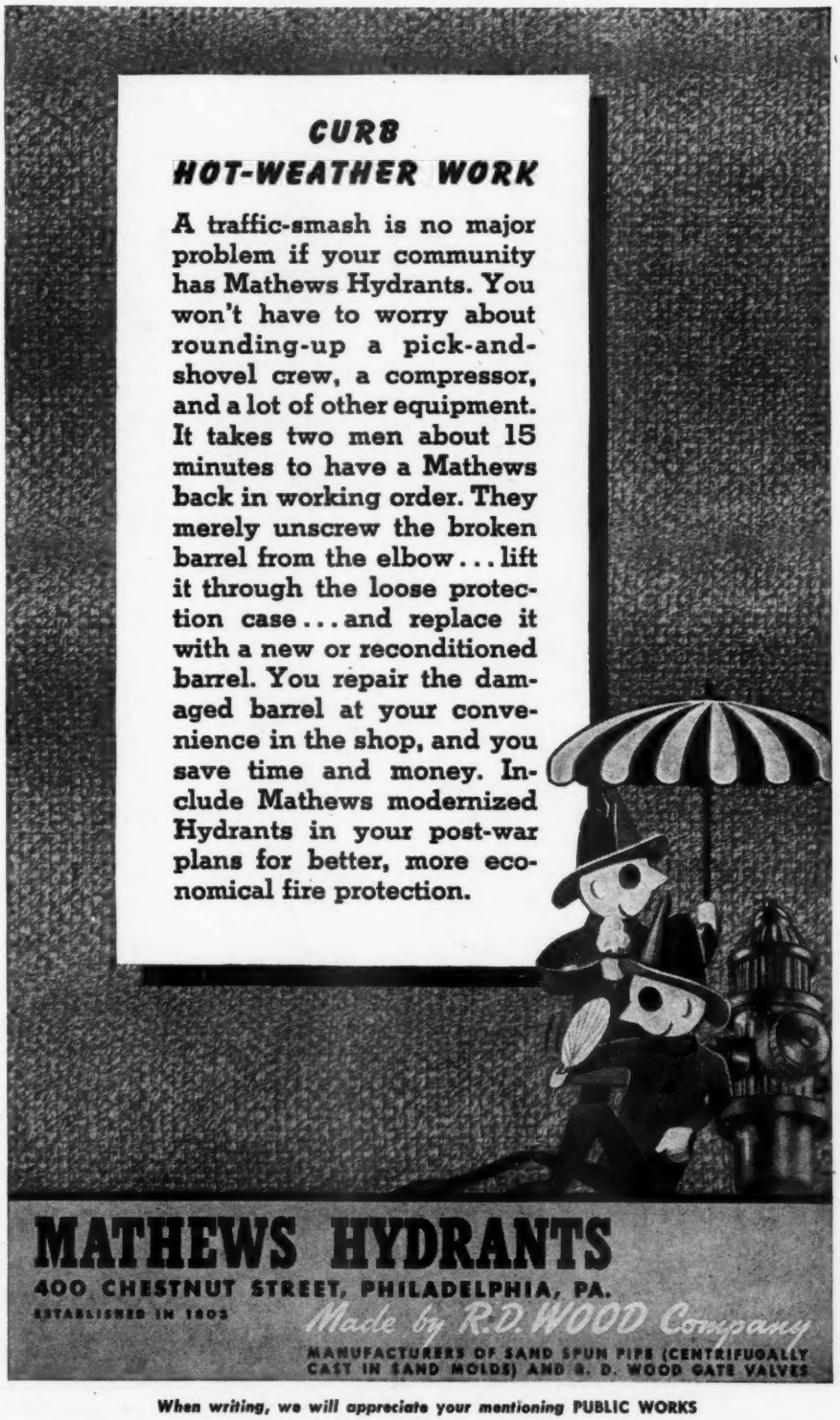
William H. Searight, Vice President of the Western Cataphote Co., Toledo, Ohio, has become sole owner of the business with the purchase of the half interest held for years by Charles T. Harther, President. The company does an extensive highway and other sign business, and manufactures reflecting house numbers.

ARMY-NAVY "E" AWARDS

The Mathieson Alkali Works, Saltville, Virginia, plant for high achievement in the production of war materials. Two of the most important products produced at that plant are caustic soda and soda ash, both of which are used in making explosives, high octane gasoline, lubricants, etc.

DeLaval Steam Turbine Company, Trenton, N. J., has

(Continued on page 70)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Airport Radio Traffic Control

5. "Highways of the Air" is a new and valuable booklet available for engineers and officials interested in radio traffic control for airports. Illustrated and non-technical. Address: Radio Receptor Co., Inc., 251 West 19th Street, New York 11, N. Y.

Bins and Batching Plants

11. Good illustrations and useful data on all types of Heltzel Highway Bins, for truck mixer charging, bulk cement plants, enclosed bucket elevators, belt conveyors, etc. Heltzel Steel Form & Iron Co., Warren, O.

Cold Mix Plants

15. New catalogs and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Concrete Curing

33. 64-page manual of concrete curing with calcium chlorides. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

Concrete, Early Strength

38. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Generators

80. Two portable generators, one for AC and the other for DC current are described in new bulletin issued by Homelite Corp., Port Chester, N. Y. Commonly used for operating electrical equipment in planes, tanks and trucks, or to charge batteries or to supplement batteries for starting main engines, etc.

Forms, Curb and Gutter

91. Curb and Gutter and Sidewalk Forms. Many types available, including battered face curb form especially for modern traffic conditions. Heltzel Steel Form & Iron Co., Warren, O., will send booklets on request.

Finishing Machines

96. Flex-Plane Finishing Machines around the world. Handsome new folder shows various models in action. One machine combines screeding and longitudinal and transverse contracton joint installing. Available from Flexible Road Joint Machine Co., Warren, Ohio.

Graders, Patrol

98. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Co., Aurora, Ill.

Joints, Expansion

103. Joint Data. Expansion and contraction ribbon joint installers. Flexplane units and finishers. Catalog illustrates how machine installs both longitudinal and tranverse joints rapidly. Flexible Road Joint Machine Co., Warren, Ohio.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee 10, Wis.

Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures, 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York 6, N. Y.

Pumps

115. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Port Chester, N. Y.

116. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

117. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

118. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3341 No. Palmer St., Milwaukee 12, Wis.

119. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

120. "Humdinger" 2- to 8-inch self-priming portable pumps. A 23-page illustrated booklet giving full details. Address: Ralph B. Carter Co., Hackensack, N. J.

Road Building and Maintenance

126. Two and Four Wheel Scrapers, Bulldozers, Tamping Rollers, Winches, Hoists and Repair Towers are subject of special bulletins issued by Gar Wood Industries, 7924 Riopelle St., Detroit 11, Mich.

127. Force Feed Loader that picks up windrowed material from road surface and loads it quickly and easily into trucks is described in new illustrated folder issued by Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Ill.

128. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

130. BG Maintainer, a powerful, speedy, low-priced machine for light road maintenance. Write for folder. Huber Mfg. Co., Marion, Ohio.

131. Speed Scoop. A versatile small scraper unit, ideal for emergency repairs. Illustrated folder issued by Huber Mfg. Co., Marion, Ohio.

Rock Drill Maintenance

132. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland 5, Ohio.

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133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio.

139. "Ironeroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. The Hercules Roller Co., Bucyrus, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Co., Aurora, Ill.

141. Three-Wheel Rollers. Huber Automative type rollers in 5 to 8 ton sizes and Huber 10 & 12 ton diesel rollers. New bulletins give full details and specifications. Huber Mfg. Co., Marion, Ohio.

142. Tandem Rollers. Variable weight tandem roller with three speeds forward and reverse for new highway surfacing and old road conditioning. Huber Mfg. Co., Marion, O.

Rotproofing

145. Cuprinol, a rotproofing chemical that protects wood from fungi and insects, yet has no offensive odor, is non-poisonous, does not corrode metal and can be painted over. Full details in booklet from Cuprinol, Inc., 7 Water St., Boston 9, Mass.

Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Division, 40 Rector St., New York 6, N. Y.

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia 7, Pa.

Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York 54, N. Y.

Fire Apparatus

300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

Snow Fighting

Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Sanitary Engineering

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia 42, Pa.

358. Air Valves are the subject of Rensselaer Bulletin Q in which Air Release, as well as Air and Vacuum, types are described. Address: Rensselaer Valve Co., Troy, N. Y.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Activation and Aeration

367. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester 6, Mass.

Blowers

370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Bodies, Special Truck

375. Gar Wood Hoists, and Bodies for every requirement including special bodies for sanitary refuse collection and for street sprinkling are illustrated and described in new catalog issued by Gar Wood Industries, 7924 Riopelle St., Detroit, Mich.

Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence 1, R. I.

Cleaning Water Mains

383. Water main cleaning by the National Method is title of 4-page folder describing methods and results obtained, with full data. National Water Main Cleaning Co., 30 Church St., New York 7, N. Y.

Cleaning Sewers With Own Forces

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles 34, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Consulting Engineers

389. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

Feeders, Chlorine, Amonia and Chemical

391. Feeders of all types including Hypochlorinators, Reagent Feeders, Dry Chemical Feeders, Chlorinators and Ammoniators are available in a wide range of capacities for feeding all of the usual chemicals used in sanitation practice—manufactured by Wallace & Tiernan Co., Newark 1, N. J.

392. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers. Inc. % 96 Codding St., Providence 1, R. I.

399. Pulsafeeders. A flow-proportional liquid chemical feeder, reciprocating type, fluid motor driven. Operating parts completely isolated from the chemical being fed. Micrometer adjustment. For feeding against high or low pressure. Wilson Chemical Feeders, Inc., 211 Clinton St., Buffalo 4, N. Y.

Filters, Vacuum

403. For bulletins on Vacuum Filters for dewatering primary, activated, digested or chemical sludge, write The Conkey Co., 420 Lexington Ave., New York 17, N. Y.

Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 436.

407. Fire hydrants which are flood-proof, easy to operate and service are described in Rensselaer Bulletin W., formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

408. For a concise description and illustrations of the Improved MUELLER-COLUMBIAN Fire Hydrants, complete parts list and full directions for ordering—get the new folder just issued by Mueller Co., Chattanooga 1, Tenn.

Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

Gas Holders and Digesters

411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

412. If your plans call for economical storage of digester gas, write for bulletin on Stacey Brothers All-Welded, High Pressure Spheres that combine safety with pleasing appearance. Stacey Brothers Gas Constr. Co., 5535 Vine St., Cincinnati 16, Ohio.

Gates, Valves, Hydrants

413. Gate, flap and check valves; floor stands and fittings. New catalog No. 44 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

415. See listing No. 436.

416. Check valves of the Clear-Way, Quiet-Closing type which eliminate "Slam" are described in Rensselaer Bulletin V. Made in expanding outlet type, as well as straight-thru type, for bolting direct to pump discharge. Address: Rensselaer Valve Co., Troy, N. Y.

417. Rensselaer Gate Valves of high tensile strength, corrosion resistant iron are described in Rensselaer Bulletin X. Address Rensselaer Valve Vo., Troy, N. Y.

418. A new four-page folder on MUELLER-COLUMBIAN Gate Valves gives construction details, shows various type of gear drive mechanism available, and has handy check list of dimensional data. Write Mueller Co., Chattanooga 1, Tenn.

419. Double-disc gate valves; hydraulically operated valves; air, check, flap and mud valves. Fire hydrants with sliding gate or balanced valve. A 32-page catalog. Ludlow Valve Mfg. Co., Inc., Troy, N. Y.

Gauges

421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

Gunite

422. The advantages of Gunite for reservoir linings, steel encasement, sidewalls and roofs, waterproofing tanks, increasing strength of existing structures, lining sewers, etc., are illustrated in a 32 page catalog issued by National Gunite Corp., 420 Lexington Ave., New York 17, N. Y.

Laboratory Equipment

423. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore 4, Md.

Manhole Covers and Inlets

429. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend 23, Ind.

Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

Meters, Water

434. Six types of iron case cold water meters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh 8, Pa.

435. "Watchdog" water meters, made in standard capacities from 20 GPM up; frost-proof or split case in household sizes. All parts interchangeable with present models of same manufacturer. For bulletins, write Worthington-Gamon Meter Co., 282-296 South St., Newark, N. J.

Pipe, Cast Iron

437. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

439. McWane Precaulked Joint Cast Iron Pipe, in all sizes from 1¼ through 12 inches for water and sewage, equipped with various type of factory-made joints, as well as B. & S. joints. Illustrated booklet issued by McWane Cast Iron Pipe Co., Birmingham, Ala.

Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

Pipe Joint Compounds

446. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer Joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address Ralph B. Carter Co., Hackensack, N. J.

448. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; alo sump and bilge pumps. Dayton-Dowd Co., Quincy, Ill.

Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis 8, Tenn.

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles 31, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

452. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

Meter Setting and Testing

454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Screens

456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

Sludge Drying and Incineration

458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 18 pages. Address: Morse Boulger Destructor Co., 205-P East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

477. All-steel Rotary Distributors, correctly designed for the small and medium sized sewage plants, are the subject of a new, well illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill. This booklet also covers distributors for various types of high-rate trickling filters.

478. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

481. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

483. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Preflocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2438 Wolfram St., Chicago 18, Ill.

489. "Carter Controlled Flocculation" is title of illustrated folder available on request from Ralph B. Carter Co., Hackensack, N. J.

490. Small type Conveyor Sludge Collector and Skimmer, Grit Collector, Aero-Filter and other equipment for small sewage treatment plants are described and illustrated in bulletins available from Chain-Belt Co., 1722 West Bruce St., Milwaukee 4, Wis.

Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh 12, Pa., for free copy.

Valves (See Gates, Air Release, etc.)

Water Treatment

495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

496. "Use of copper sulphate in water treatment plants" titles informative booklet, with valuable data on chemicals, dosage, etc. Write Tennessee Corporation, Atlanta 1, Ga.

497. Ferri-floc Ferric Sulphate — a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio.

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ARMY-NAVY "E" AWARDS

(Continued from page 65)

DeLaval Steam Turbine Company, Trenton, N. J., has been awarded a fourth "E" in recognition of the splendid production record that has been established and maintained since the award of the original Navy "E" two years ago.

Davey Compressor Company, Kent, Ohio, has been awarded a star and renewal of Army-Navy "E."

The Frank G. Hough Company, Libertyville, Illinois, has been awarded a white star for its Army-Navy "E" pennant. This star award was made to signify that the company has maintained its high production standards of war material since last December when it was awarded the "E" pennant.

Builders Iron Foundry (Builders-Providence, Inc.), Providence, R. I.. has been awarded a third star for its Army-Navy "E" pennant.

E. D. Etnyre & Company, Oregon, Illinois, has been awarded the Army-Navy "E." Lt. Col. Coil and Lt. Comdr. Brick praised the contributions to the war effort made by Etnyre and their employees for greatly increasing their output without major expansion of factory space and machines.

Worthington-Gamon Meter Company, Newark, N. J., has been awarded the Army-Navy "E" production award.

Infilco, Inc., 325 West 25th Place, Chicago 16, Ill., were awarded the Army-Navy "E" flag in September 1943 and the white star addition was made on May 27th, 1944.

CONVENTIONS

September 12-13, 1944. . . . The North Dakota Water and Sewage Works Conference will hold its 16th annual convention at the Strand-Pacific Hotel, Bismarck, N. D. The North Dakota League of Municipalities will hold its annual convention at the same time.

September 19-20, 1944. . . . South Dakota Water and Sewage Works Conference, The Lincoln Hotel, Watertown, South Dakota.

October 12-14, 1944. . . . Pennsylvania Sewage Works Association, William Penn Hotel, Pittsburgh, in conjunction with the Federation of Sewage Works Associations.

Carolina Road Builders Affiliates with ARBA

Organization of the Carolina Road Builders Association has been completed and the new group has affiliated with the American Road Builders' Association.

The new Association will serve both North Carolina and South Carolina, with headquarters in Raleigh, N. C. Heading the new Association is President Nello L. Teer, Jr., of Durham, N. C. Mr. Teer has been associated for many years with his father, a pioneer in the contracting business in the South.

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